IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

APPLERA CORPORATION, MDS INC., and APPLIED BIOSYSTEMS/MDS SCIEX INSTRUMENTS, *Plaintiffs*, v. THERMO ELECTRON CORPORATION, *Defendant*.	C.A. No. 04-1230-GMS
THERMO FINNIGAN LLC, *Plaintiff*, v. APPLERA CORPORATION, MDS INC., and APPLIED BIOSYSTEMS/MDS SCIEX INSTRUMENTS *Defendants*.	C.A. No. 05-110-GMS

AB/SCIEX'S OPENING CLAIM CONSTRUCTION BRIEF

November 18, 2005

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Plaintiffs Applera Corporation, MDS Inc., and Applied Biosystems/MDS Sciex Instruments (collectively, "AB/Sciex") respectfully submit this opening claim construction brief setting forth their proposed construction of the disputed terms and phrases in the asserted claims of the patents in these consolidated actions.

NATURE AND STAGE OF PROCEEDING

On September 7, 2004, AB/Sciex brought an action for infringement of U.S. Patent No. 4,963,736 ("the '736 patent") against Thermo Electron Corporation, which was assigned C.A. No. 04-1230-GMS. The Court construed many of the disputed claim terms and phrases in a prior litigation in which AB/Sciex successfully asserted the '736 patent against Micromass. In response to AB/Sciex's lawsuit, on February 23, 2005, Thermo Finnigan LLC (together with Thermo Electron Corporation, collectively "Thermo") brought an action alleging infringement of U.S. Patent No. 6,528,784 ("the '784 patent") against AB/Sciex, which was assigned C.A. No. 05-110-GMS. On May 9, 2005, the Court ordered opening and answering briefs on claim construction issues to be filed on November 18 and December 12, 2005, respectively, and scheduled a consolidated hearing in both cases on claim construction issues for January 9, 2006. Fact discovery in both cases is scheduled to close on March 17, 2006. A jury trial in both cases is scheduled to begin on December 4, 2006.

SUMMARY OF ARGUMENT

AB/Sciex has proposed constructions of the disputed terms and phrases in the patents in suit that comport with their ordinary meaning as understood by one of ordinary skill in the art reading the specification and prosecution history. Thermo's proposed constructions of terms in AB/Sciex's '736 patent seek to limit the scope of the invention by impermissibly reading in limitations from the preferred embodiments and by

distorting the reexamination prosecution history. Thermo also challenges the Court's construction of several claim terms and phrases in the '736 patent from the earlier litigation against Micromass. Thermo takes the opposite approach in its proposed constructions of the terms in Thermo's '784 patent, seeking expansive or vague constructions. Thermo's proposed constructions should be rejected, and the Court should construe the disputed terms and phrases as AB/Sciex proposes.

PART I – AB/SCIEX'S DOUGLAS '736 PATENT (C.A. 04-1230-GMS)

STATEMENT OF FACTS

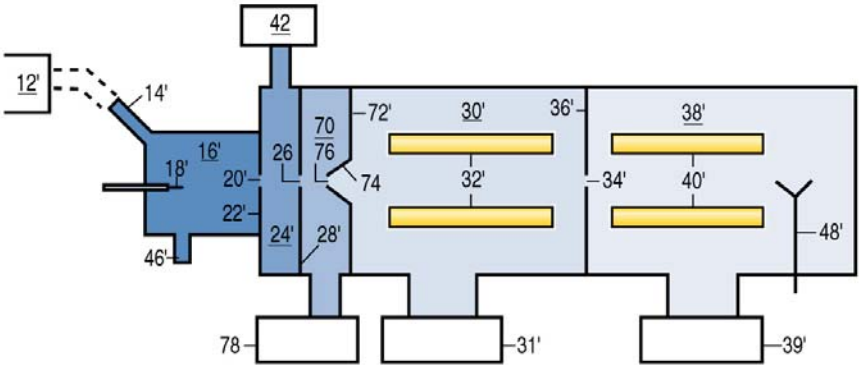
A. The '736 Patent and its Technological Background

1. The Mass Spectrometer Described in the '736 Patent

AB/Sciex's '736 patent relates to a mass spectrometer and its method of operation. JA16, 1:6-12; 1:55-2:39.[1] Mass spectrometers are used to analyze trace substances in a sample gas or liquid and obtain information about the molecular weight of compounds or their chemical structures. *Id.*, 1:15-16. A mass spectrometer creates electrically charged particles (called "ions") from a sample compound, and uses electric fields to sort ions by mass-to-charge ratio. In the type of mass spectrometer described in the '736 patent (a "quadrupole mass spectrometer"), the electric fields involved in the mass analysis are produced by applying voltages to a set of four parallel metal rods. The '736 patent illustrates two embodiments of a quadrupole mass spectrometer in Figures 1 and 12. Figure 12, with non-substantive alterations,[2] is reproduced below. *See* JA10.

[1] "JA__" refers to the Joint Appendix being filed herewith. "A__" refers to AB/Sciex's Appendix also being filed herewith.

[2] The illustration is the mirror image of Figure 12, with the path of ion travel going from left to right, rather than from right to left as shown in the '736 patent, and with shades of blue added from dark to progressively lighter to show the diminishing gas density (*i.e.*, lower pressure).



Molecules in a sample containing a trace substance to be analyzed are vaporized and converted into ions in an ion source 16' at atmospheric pressure. JA17, 4:7-16. Ions, and a much larger number of neutral gas molecules, enter a vacuum chamber 30' containing the ion guide 32' through an inlet orifice 76. JA19, 8:60-68. The ion guide transmits ions entering the vacuum chamber 30' to the vacuum chamber 38' containing a quadrupole mass filter 40' and detector 48'.

The ion guide 32' performs the functions of "focussing and separation [of ions] from an accompanying gas." JA16, 1:9; JA17, 4:38-46. It consists of a set of four rods. JA17, 4:21-23. The rods are arranged to form a passageway between them, the longitudinal axis of which is aligned with the inlet and exit orifices of the ion guide. An AC (alternating current) or RF (radio-frequency) voltage is applied to the rods in such a manner that the AC voltage alternates between adjacent pairs of rods so that when one rod is fully positive, the adjacent rod is fully negative. JA17, 4:43-46. Once the ions enter the passageway between the rods, the alternating AC voltage confines the ions, but not neutral gas molecules, within the passageway. Thus, neutral gas molecules are pumped out by the pump (31') while the ions are confined. As ions approach a rod, the repulsive force grows stronger until the ions are re-directed away from the rod. In this way the ions oscillate from one side of the passageway to the other as they travel down the passageway. JA17, 4:43-46 ("An AC RF voltage . . . is applied between the rods of

rod set 32, as is well known, to permit rod set 32 to perform its guiding and focusing function."). Ions that strike a rod have their charges extinguished, *i.e.*, are neutralized, and thus can no longer be influenced and directed by the electric fields in the instrument nor detected by the detector.

At the end of the passageway between the rods, the ions encounter a wall having an orifice (34'). In the embodiments described in the '736 patent, the orifice leads directly to the mass analyzer section (ref. 38'); that is, there is no intermediate pressure stage. As the ions exit the passageway, they will either make contact with the wall or pass through orifice 34'. JA20, 10:52-66. Because the size of the orifice (34') is smaller than that of the passageway formed by the rods, some ions will contact the wall and be neutralized and not pass through the orifice. Just like ions that strike a rod, the ions that contact the wall are thus lost for purposes of analysis.

The mass analyzer section illustrated schematically in the '736 patent (38') includes a single quadrupole rod set that has both an AC voltage and a DC voltage applied between rods. JA17, 4:46-50. The DC voltage destabilizes the trajectory of all ions except the ions of interest, thereby ejecting the unwanted ions between the rods or into the rods themselves. In the mass filter embodiments described in the '736 patent, ions that have been "selected" by the mass filter proceed to the detector section where they are detected. *Id.*

2. The Product of the Pressure and Rod Length (P x L) and Kinetic Energy Operating Parameters of the Ion Guide of the '736 Patent

Maximizing the transfer efficiency of an ion guide is desirable because the more ions that are available to be analyzed, the greater the sensitivity of the device. Prior to the invention of the '736 patent, it was believed that an ion guide should be operated at a "low" pressure, typically 10^{-4} torr or less, to maximize the transmission of ions from the

ion source to the mass filter.[3] JA17-18, 4:56-5:2. The belief at that time was that as the pressure in the ion guide *increased*, ion transmission would *decrease*, since the greater abundance of inert gas molecules would cause more collisions between the ions and gas molecules and cause the ions to "scatter." JA18, 5:16-40. A scattered ion undergoes a change in trajectory, which increases the probability that the ion will contact either the rods or a wall of the ion guide and be lost. *Id.*

Through a series of experiments performed on two different mass spectrometers, depicted schematically in Figures 1 and 12 of the '736 patent, inventors Dr. Donald Douglas and Dr. John Barry French discovered that *increasing* the pressure in the ion guide unexpectedly caused an *increase* in ion transmission. JA18, 5:41-50. The increased ion transmission increased the sensitivity of the mass spectrometer because more ions were available for detection. These benefits are obtained through the use of what the '736 patent calls "collisional focusing" – using low energy collisions within a focusing field to concentrate or "focus" the ions into a dense beam along the centerline of the passageway. JA18-19, 6:62-7:9; JA19, 7:58-62. The highly concentrated beam transmits more ions through the relatively small orifice leading out of the ion guide than otherwise might be possible. The inventors determined that:

> [t]he significant parameter, then, is the pressure in chamber 30, 30' times the length of the AC-only rods 32, 32'. This product . . . will be called the *PL product* and is expressed in torr-cm.

[3] The '736 patent refers to two papers that exemplify the use of low pressures in the ion guide sections of a mass spectrometer: (1) Richard D. Smith, *On-Line Mass Spectrometric Detection for Capillary Zone Electrophoresis*, 59 Anal. Chem. 1230 (1987) (A1-3) ("the first Smith reference"); and (2) Richard D. Smith, *Capillary Zone Electrophoresis – Mass Spectrometry Using an Electrospray Ionization Interface*, 60 Anal. Chem. 436 (1988) (A4-9) ("the second Smith reference"). JA18, 5:3-15.

JA22, 13:27-31 (emphasis added). Based on their experiments, they concluded that improved ion transmission would be obtained at a P x L at or above 2.25 x 10^{-2} torr cm. *Id.*, 13:32-35.

At various ion guide pressures within the range explored in their experiments, the inventors also varied the DC difference voltage between the inlet orifice and the rod set to examine the effect of ion kinetic energy on the ion signal. JA21, 12:30-63. They discovered that it is important for the kinetic energies of the ions moving between the inlet to the passageway defined by the rods of the ion guide to be maintained relatively low, and, in particular, below the level at which significant fragmentation of the ions would occur through collision induced dissociation. *Id.*, 12:44-49.

B. The Original and Reexamination Prosecution of the '736 Patent

1. The Original Prosecution of the '736 Patent

The application that issued as the '736 patent was filed on November 15, 1989, claiming priority from a Canadian application filed on December 12, 1988.[4] On May 8, 1990, in the first Office Action, the Examiner allowed all the claims as originally filed. The '736 patent issued on October 16, 1990 with twenty-four claims, of which claims 1 and 14 are independent.

2. The Reexamination of the '736 Patent

On September 30, 1997, patent owner MDS Health Group, Inc., now plaintiff MDS Inc. ("MDS"), requested reexamination of the '736 patent in light of eight prior art references that had not been considered during the original prosecution.[5] Four of the references disclosed "ion traps"—the Schaaf article, the Vedel article, the Stafford article

[4] A copy of the original prosecution file history is included in the Joint Appendix at Tab 3.

[5] A copy of the reexamination file history is included in the Joint Appendix at Tab 4.

and the Stafford application.[6] The other four references disclosed "tandem mass spectrometers" and included a prior patent application of inventor Dr. French ("the French application"). JA171-72.

An ion trap that is exemplary of those described in the four references that were cited in the Reexamination Request appears in Figure 1 of the Stafford article, reproduced below:

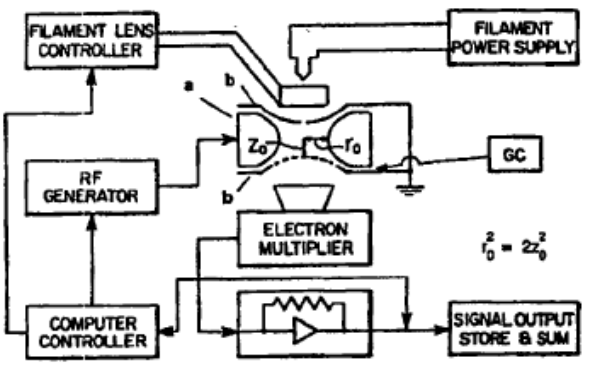


Fig.1. Schematic diagram of the Ion Trap Detector. The ring electrode, and the end cap electrodes are labelled 'a' and 'b' respectively.

As the caption indicates, the structure includes a "ring electrode" and two "end cap electrodes," shown in cross section in the Figure.

In the Reexamination Request, MDS distinguished the ion trap references on several grounds. First, MDS distinguished the references on the basis that they did not disclose any of the following elements of the claimed mass spectrometer or method: first and second vacuum chambers; first and second rod sets; an inlet orifice; an interchamber orifice; the application of an AC-only voltage to a first rod set; the application of AC and

[6] H. Schaaf , U. Schmeling & G. Werth, *Trapped Ion Density Distribution in the Presence of He-Buffer Gas*, 25 Applied Physics 249 (1981) ("Schaaf article") (JA249-51); F. Vedel & J. Andre, *Influence of Space Charge on the Computed Statistical Properties of Stored Ions Cooled by a Buffer Gas in a Quadrupole RF Trap*, 29 Physical Rev. 2098 (1984) ("Vedel article") (JA252-54); G.C. Stafford, P.E. Kelley, J.E.P. Syka, W.E. Reynolds & J.F.J. Todd, *Recent Improvements in and Analytical Applications of Advanced Ion Trap Technology*, 60 Int'l J. of Mass Spectrometry & Ion Processes 85 (1984) ("Stafford article") (JA255-68); and Stafford *et al.*, European Patent Application, Publication No. 0 0113207, July 11, 1984 ("Stafford application") (JA270-301).

DC voltages to a second rod set; the product of the pressure in the first vacuum chamber and the length of the first rod set of at least 2.25 x 10^{-2} torr cm; and maintaining the kinetic energies of ions at a relatively low level as they travel from an inlet orifice to a first rod set. JA175 (Schaaf); JA176 (Vedel); JA177-78 (Stafford article); JA178-79 (Stafford application). Second, MDS further distinguished Schaaf on the ground that the AC-only rod set (ion guide) in the claimed invention does not trap ions for analysis but rather guides the ions through the ion guide into the mass analyzer. JA173-75. Third, MDS further distinguished Schaaf and Vedel on the ground that it would not have been obvious to use a high-pressure gas in the claimed ion guide because the ion trap references suggest that this would cause ion losses due to scattering. JA174 (Schaaf); JA176 (Vedel).

On November 20, 1997, the examiner granted MDS's Reexamination Request, stating that the French application, considered with other tandem mass spectrometer references, raised a substantial new question of patentability. JA378. The examiner did not find that any of the ion trap references raised a substantial new question of patentability. In the first Office Action, dated February 3, 1998, the examiner rejected the claims essentially on the grounds set forth in the reexamination grant, relying primarily on the French application. *See* JA383. After an in-person interview with inventor Dr. Douglas and MDS's attorney, followed by submission of an Amendment and a Declaration of Dr. French addressing the pertinence of the French application, the examiner issued a final Office Action confirming the validity of the original claims 1 to

24. JA434-35.[7] On May 25, 1999, the Patent Office issued Reexamination Certificate No. B1 4,963,736. JA24-25.

C. The Prior Litigation on the '736 Patent against Micromass

1. The Court's Claim Construction in the Micromass Case

Prior to filing this suit against Thermo, AB/Sciex successfully asserted the '736 patent in the Court against the Quattro Ultima mass spectrometer made by Micromass UK Ltd. and sold in the U.S. by Micromass Inc. (collectively, "Micromass").

After extensive briefing and a *Markman* hearing, the Court construed almost every claim term of the '736 patent. The Court's thorough claim construction opinion is reported at *Applera Corp. v. Micromass UK Ltd.*, 186 F. Supp. 2d 487 (D. Del. 2002) (JA485-528). After a ten-day jury trial on infringement, invalidity and damages issues, the jury found the '736 patent valid and infringed by Micromass's Quattro Ultima mass spectrometers and awarded AB/Sciex $47.5 million in damages. The Court denied Micromass's post-trial motions and dismissed its antitrust counterclaims. Moreover, after a one-day bench trial, the Court rejected Micromass's inequitable conduct and equitable estoppel defenses. The Court's post-trial opinion is reported at *Applera Corp. v. Micromass UK Ltd.*, 204 F. Supp. 2d 724 (D. Del. 2002) (JA529-89).[8]

Micromass appealed to the Federal Circuit, challenging the Court's construction of the claim terms "end to end," "separated by a wall," "interchamber orifice," "second rod set," and "second vacuum chamber." Micromass also argued that the Court erred by failing to construe the claim term "improved transmission of ions" and proposed its own

[7] The examiner, however, rejected newly added claims 25-30. After submission of further amendments, these claims were also allowed.

[8] The Court also denied Micromass's motion for reconsideration of certain aspects of its claim construction. *See id.* at 747-49 (JA552-54).

construction. Finally, Micromass also challenged the infringement and damages verdicts on a number of additional grounds. In a brief *per curiam* order issued about a week after oral argument, the Federal Circuit rejected every one of Micromass's arguments by affirming the judgment "on the basis" of the Court's claim construction and post-trial opinions. *Applera Corp. v. Micromass UK Ltd.*, 60 F.App'x 800 (Fed. Cir. 2003) (JA590).

2. Thermo's Challenges to the Court's Claim Construction from the Micromass Case

As explained below in more detail, despite the Court's thorough claim construction analysis in the Micromass case and the Federal Circuit's affirmance, Thermo seeks to challenge the Court's prior claim construction of the following claim terms: (1) "separated by a wall," (2) "interchamber orifice," (3) "located end to end," (4) "means. . . for directing said ions through said inlet orifice into said first vacuum chamber," (5) "means for flowing gas through said inlet orifice into said first space," (6) "means for maintaining the kinetic energies of ions moving from said inlet orifice to said first rod set at a relatively low level," and (7) "whereby to provide improved transmission of ions through said interchamber orifice."

D. The Accused Thermo Instruments and Thermo's Noninfringement Positions

AB/Sciex has accused the Thermo TSQ Quantum and LTQ series of mass spectrometers of infringement of the '736 patent.

1. Thermo TSQ Quantum Series

The Thermo TSQ Quantum series[9] of mass spectrometers have all the components of the embodiment shown in Figures 1 and 12 of the '736 patent, including

[9] The Thermo TSQ Quantum series includes the TSQ Quantum, TSQ Quantum Ultra and TSQ Quantum Discovery mass spectrometers.

an ion source, an ion guide comprising an AC-only rod set in a vacuum chamber, and a mass filter comprising an AC-DC rod set in a vacuum chamber. Unlike Figure 12, the TSQ Quantum has two ion guide stages instead of one, and, since it is a tandem mass spectrometer, it also includes a collision cell and a second mass filter. A schematic of the mass spectrometer components of the TSQ Quantum from one of Thermo's manuals is shown below. A34.

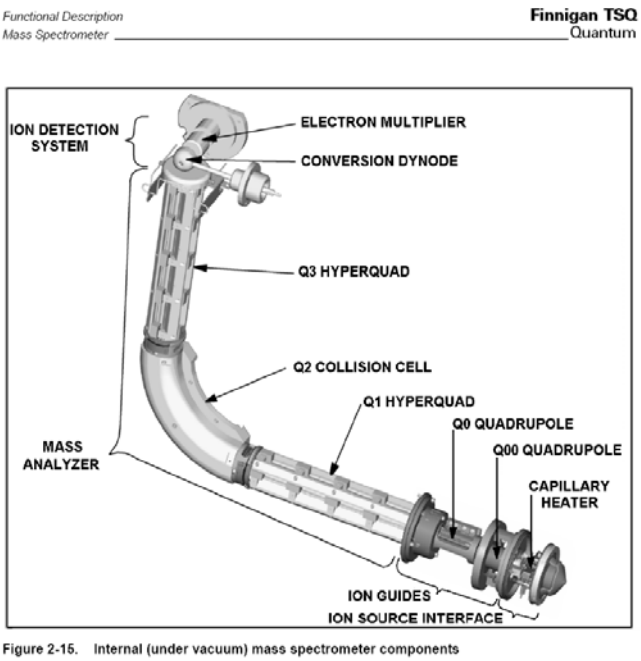


Figure 2-15. Internal (under vacuum) mass spectrometer components

The two-stage ion guide of the TSQ Quantum includes two vacuum chambers (depicted as "Q00" and "Q0"), each of which includes an AC-only quadrupole rod set, *i.e.*, a set of four rods, arranged to provide a passageway through which ions are guided. *Id.* The Q00 chamber corresponds to the claimed "first vacuum chamber" with a "first rod set" of the '736 patent, *i.e.*, the ion guide. The product of the rod length and the pressure of the first ion guide stage (Q00) exceeds the 2.25 x 10^{-2} torr cm threshold of the '736 patent. Ions exit the Q00 chamber through an orifice, travel through the second ion guide stage (Q0) and then pass into the mass analyzer section, which is a tandem mass analyzer that includes three stages: a first mass filter stage (depicted as "Q1"), a collision

cell (depicted as "Q2"), and a second mass filter stage (depicted as "Q3"). A38. The first mass filter stage (Q1) includes an AC-DC quadrupole rod set that defines a passageway for the ions. A39. The Q1 chamber corresponds to the claimed "second vacuum chamber" with a "second rod set" of the '736 patent, *i.e.*, the mass analyzer chamber.

2. Thermo LTQ Series

The Thermo LTQ series[10] of mass spectrometers also have all the components of the embodiment shown in Figures 1 and 12 of the '736 patent, including an ion source, an ion guide comprising an AC-only rod set in a vacuum chamber, and a mass filter comprising an AC-DC rod set in a vacuum chamber. Unlike Figure 12, the LTQ has three ion-guide stages instead of one, and, since it is a linear ion trap mass spectrometer, it uses a linear ion trap as the mass filter. A schematic of the ion guide and mass filter components of the LTQ from one of Thermo's manuals is shown below. A89.

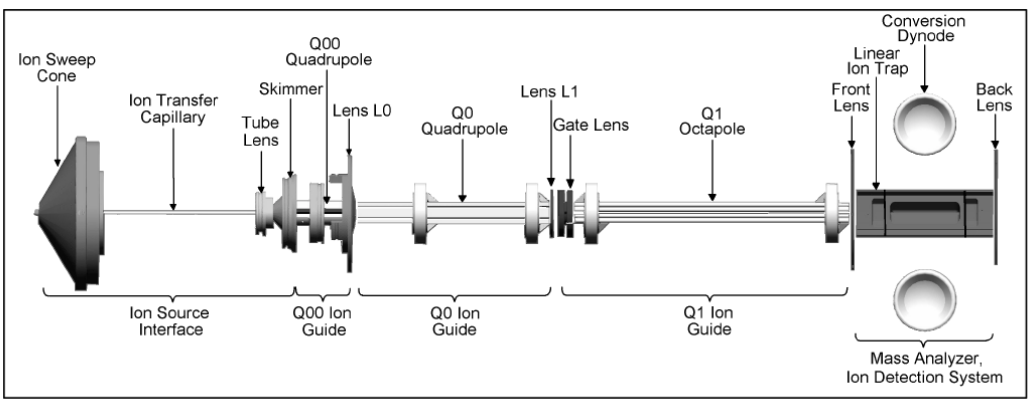


Figure 2-9. Internal (under vacuum) components of the MS detector

The three-stage ion guide of the LTQ includes three vacuum chambers, the first two of which (depicted as "Q00" and "Q0") each includes an AC-only quadrupole rod set arranged to provide a passageway through which the ions are guided, and the last of which (depicted as "Q1") includes an AC-only octapole rod set, *i.e.*, a set of eight rods.

[10] The Thermo LTQ series includes the LTQ, LTQ FT and LTQ Orbitrap mass spectrometers.

A89-91. The Q00 chamber corresponds to the claimed "first vacuum chamber" with a "first rod set" of the '736 patent, *i.e.*, the ion guide. The product of the rod length and the pressure of the first ion guide stage (Q00) exceeds the 2.25 x 10^{-2} torr cm threshold of the '736 patent. Ions exit the Q00 chamber through an orifice, travel into the second and third ion guide stages (Q0 and Q1) and pass into the mass analyzer section. The mass analyzer section of the LTQ is a linear ion trap which includes an AC-DC quadrupole rod set, as shown below in one of Thermo's manuals. A91-92.

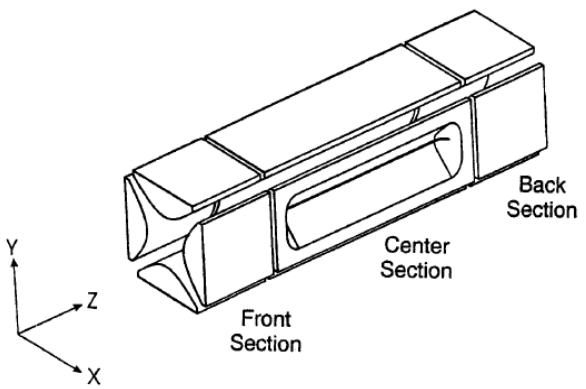


Figure 2-10. Linear ion trap quadrupome rod assembly

The linear ion trap chamber corresponds to the claimed "second vacuum chamber" with a "second rod set" of the '736 patent, *i.e.*, the mass analyzer chamber.

3. Thermo's Noninfringement Positions

Thermo's noninfringement positions are based on unduly narrow claim constructions that are impermissibly based on importing limitations from the preferred embodiments of the specification and distorting the reexamination prosecution history. Some of Thermo's interpretations seek to limit the claims to the specific structural arrangement of the preferred embodiments. Others seek to limit the claims to certain operating parameters based on alleged disclaimers during the reexamination. Some are also inconsistent with the Court's prior constructions in the Micromass case. As

explained below, Thermo's narrow litigation-motivated constructions are not supported by the claim language, specification or prosecution history, and should be rejected.

ARGUMENT

I. DISPUTED TERMS INVOLVING THE PREVIOUSLY DECIDED ISSUE OF WHETHER THE CHAMBERS MUST BE ADJACENT

A. "Separated by a Wall" and "Separated by an Interchamber Orifice"

Proposed Construction: *"Separated by a Wall"—At least a wall between the first and second vacuum chambers.*

"Separated by an Interchamber Orifice"—An orifice in a wall between the first and second vacuum chambers.

In the Micromass litigation, Micromass proposed constructions of several phrases in independent claims 1 and 14 of the '736 patent that would have limited the claims to mass spectrometer systems in which the "first" and "second" vacuum chambers housing the "first rod set" (ion guide) and "second rod set" (mass filter), respectively, are adjacent to each other. Micromass sought to exclude from the scope of the claims its Quattro Ultima mass spectrometer, which included an additional vacuum chamber and ion guide between the "first" and "second" vacuum chambers. Micromass thus asked the Court to construe the phrase "first and second vacuum chambers *separated by a wall*" in claim 1 to require that no structure other than the recited wall be between the two chambers and the phrase "first and second spaces . . . separated by an interchamber orifice" in claim 14 to require that the interchamber orifice join or link the two chambers. *Applera*, 186 F. Supp. 2d at 509-10 (JA507-08).

The Court correctly rejected Micromass's constructions as seeking to import limitations from the preferred embodiments in the specification into the claims. *Id.* The Court construed the phrase "separated by a wall" in accordance with its ordinary meaning to mean that there is "at least a wall between the first and second vacuum chambers" and

the term "interchamber orifice" to mean that there is "an orifice in a wall that is between the first and second vacuum chambers," thus allowing for the presence of other structures in addition to the recited wall that also separate the two chambers. *Id.* at 510 (JA508).

On appeal, Micromass argued for reversal of the judgment on the basis that the Court's constructions of "separated by a wall" and "separated by an interchamber orifice" were erroneous. A149-53. The Federal Circuit rejected Micromass's proposed constructions and confirmed the correctness of the Court's constructions by affirming the judgment below "on the basis" of the Court's analysis. *Applera*, 60 F.App'x 800 (JA590).

Thermo proposes constructions of "separated by a wall" and "separated by an interchamber orifice" that are substantively the same as those proposed by Micromass and rejected by the Court and the Federal Circuit, and for exactly the same reason. Thermo proposes that "separated by a wall" be construed to mean "that a wall defines a common boundary of each of the first and second vacuum chambers," *i.e.*, that the two chambers are separated only by a wall and no other structures. Each of the accused TSQ Quantum series instruments has an additional vacuum chamber and ion guide between the "first" (ion guide) and "second" (mass filter) vacuum chambers, just as Micromass's infringing Quattro Ultima instrument did. The accused LTQ instrument has two additional ion guides. Thermo's constructions seek to limit the claims to the preferred embodiments in order to exclude its mass spectrometers.

In view of the Court's prior construction and the Federal Circuit's affirmance, Thermo's constructions should be rejected under the doctrine of *stare decisis*. *See Burke, Inc. v. Bruno Indep. Living Aids, Inc.*, 183 F.3d 1334, 1341-42 (Fed. Cir. 1999) (reversing grant of summary judgment of noninfringement based on a claim construction that was

inconsistent with the construction adopted by the Federal Circuit in a prior nonprecedential opinion in another case); *Tate Access Floors, Inc. v. Interface Architectural Res., Inc.*, 185 F. Supp. 2d 588, 595 n.4 (D. Md. 2002) ("Prior claim constructions [by the Federal Circuit], when on point, are given deference under the doctrine of *stare decisis* in the interest of uniformity and consistency in claim interpretation"); *Wang Labs., Inc. v. Oki Elec. Indus. Co.*, 15 F. Supp. 2d 166, 176 (D. Mass. 1998) ("Despite its inability to participate in the [prior] litigation, [the accused infringer] is nevertheless bound by the rule of law established in [the Federal Circuit's claim construction in the prior suit]").

Thermo's constructions should also be rejected because they are incorrect. The claim language does not exclude structure in addition to a wall between the first and second vacuum chambers. Claims 1 and 14 define the mass spectrometer system and method as "comprising" the elements that follow, and, therefore, do not exclude the presence of other structures. *See, e.g., Phillips Petroleum Co. v. Huntsman Polymers Corp.*, 157 F.3d 866, 874 (Fed. Cir. 1998). The use of the indefinite article "a" in the phrase "separated by a wall" further supports a construction that permits other structures to be between the first and second vacuum chambers. *See KCJ Corp. v. Kinetic Concepts*, 223 F.3d 1351, 1356 (Fed. Cir. 2000) ("This Court has repeatedly emphasized that an indefinite article 'a' or 'an' in patent parlance carries the meaning of 'one or more' in open-ended claims containing the transitional phrase 'comprising.'").

The phrase "separated by a wall" does not appear in the specification. Although the preferred embodiments shown schematically in Figures 1 and 12 show the ion guide chamber being separated from the mass filter chamber by only a wall, the specification does not describe any functional constraint (other than the necessity that ions be able to

travel from the first vacuum chamber to the second vacuum chamber, and the necessity that the ion guide chamber and the mass filter chamber be at different pressures, as discussed above) that would preclude the presence of other structures between the first and second vacuum chambers. There is no basis for limiting the claims to the preferred embodiments described in the specification. "[A]lthough the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments." *Phillips v. AWH Corp*., 415 F.3d 1303, 1323 (Fed. Cir. 2005); *see also Specialty Composites v. Cabot Corp.*, 845 F.2d 981, 987 (Fed. Cir. 1988); *Interactive Gift Express, Inc. v. CompuServe Inc.*, 256 F.3d 1323, 1340 (Fed. Cir. 2001); *Network, LLC v. Centraal Corp.*, 242 F.3d 1347, 1352 (Fed. Cir. 2001); *Burke*, 183 F.3d at 1341.

Finally, nothing in the original or reexamination prosecution history provides a basis for restricting the meaning of the phrase "separated by a wall" to "separated only by a wall." No prior art was distinguished on the basis that the claims required that the first and second vacuum chambers be separated only by a wall. There is simply no support for Thermo's construction.

B. "Located End to End"

Proposed Construction: *The rod sets and spaces must be arranged in a manner that ions may be successfully transmitted from the end of the first rod set or the first space to the end of the second rod set of the second space.*

Thermo also opposes the construction of the phrase "located end to end" in claims 1 and 14 that was adopted by the Court in the Micromass litigation and affirmed by the Federal Circuit. In claim 1, the phrase refers to the arrangement of the rod sets: "said first rod set being located end to end with said second rod set." In claim 14, the phrase

refers to the corresponding arrangement of the spaces defined by the rod sets: "first and second spaces respectively located end-to-end with each other."

In the Micromass litigation, the Court construed "located end to end" to mean that "the rod sets and spaces must be arranged in a manner that ions may be successfully transmitted from the end of the first rod set or the first space to the end of the second rod set or second space." *Applera*, 186 F. Supp. 2d at 513-14 (JA511-12). The Court rejected the construction Micromass proposed that would have required that the end of one rod set or space be placed against the end of the other rod set or space. *Id.* at 511 (JA509), 514 (JA512). Micromass's construction was yet another attempt to have the claims confined to the preferred embodiments, in which the chambers are adjacent to each other. Micromass challenged the Court's construction of "end to end" on appeal, but the Federal Circuit implicitly rejected Micromass's proposed construction and confirmed the correctness of the Court's construction by affirming the judgment below "on the basis" of the Court's analysis. *Applera*, 60 F.App'x 800 (JA590).

Thermo does not propose a contrary construction of "located end to end." Instead, it contends that no construction is necessary in view of the construction of "aligned," on which the parties agree (and which was adopted by the Court in the Micromass litigation). Claim 1 recites: "said first rod set being located end to end with said second rod set so that said first and second spaces are aligned." The construction of "aligned" – "being in or coming into precise adjustment or correct relative position" – will tell the jury that the spaces must be in "correct relative position" but does not itself explain what that means in this context. The construction of "located end to end" provides that explanation – that "the rod sets and spaces must be arranged in a manner that ions may be successfully transmitted from the end of the first rod set or the first

space to the end of the second rod set or second space." Moreover, the term "aligned" does not appear in claim 14 but the phrase "located end to end" does. The construction of "aligned" in claim 1 will not help the jury understand what "located end to end" means in claim 14. Therefore, the construction of "located end to end" will assist the jury and should be included.

II. DISPUTES INVOLVING THE PREVIOUSLY DECIDED IDENTIFICATION OF CORRESPONDING STRUCTURES IN THE CONSTRUCTIONS OF CERTAIN MEANS-PLUS-FUNCTION LIMITATIONS

A. "Means . . . for Directing Said Ions Through Said Inlet Orifice"

Proposed Construction: *The function of the element is "directing said ions through said inlet orifice into said vacuum chamber."*

The corresponding structure, material, or acts described in the specification is either, or both, of two independent operating parameters: (1) the application of appropriate DC potential between the inlet orifice and the rod set in the first vacuum chamber; and/or (2) a difference in the pressures on either side of the inlet orifice.

AB/Sciex and Thermo agree that the phrase "means . . . for directing said ions through said inlet orifice into said first vacuum chamber" in element (b) of claim 1 is a means-plus-function element subject to 35 U.S.C. § 112, ¶ 6.

A means-plus-function limitation is one which recites a function to be performed rather than the structure or materials for performing that function. *Northrop Grumman Corp., v. Intel Corp.*, 325 F.3d 1346, 1350 (Fed. Cir. 2003). "Such a limitation is construed 'to cover the corresponding structure, materials, or acts described in the specification and equivalents thereof.'" *Id.* (citing 35 U.S.C. § 112, ¶ 6; *Chiuminatta Concrete Concepts, Inc. v. Cardinal Indus., Inc.*, 145 F.3d 1303, 1309-09 (Fed. Cir. 1998)). "The first step in construing a means-plus-function limitation is to identify the

function explicitly recited in the claim." *Asyst Techs., Inc. v. Empak, Inc.*, 268 F.3d 1364, 1369 (Fed. Cir. 2001) (citing *Budde v. Harley-Davidson, Inc.*, 250 F.3d 1369, 1376 (Fed. Cir. 2001)). The next step is to identify the corresponding "structure, materials, or acts" set forth in the written description that performs the particular function set forth in the claim. *Asyst Techs.*, 268 F.3d at 1369.

AB/Sciex and Thermo agree that the function for this means-plus-function limitation is "directing said ions through said inlet orifice into said first vacuum chamber." However, AB/Sciex and Thermo disagree on the corresponding structure disclosed in the specification for performing this function.

AB/Sciex's proposed construction of the corresponding structure was adopted by the Court in the Micromass case.[11] *Applera*, 186 F. Supp. 2d at 519 (JA517), 530 (JA528). Since claim construction is a matter of law, the Court's prior construction should be given deference. *Markman v. Westview Instr., Inc.*, 517 U.S. 370, 391 (1996) (*stare decisis* should promote uniformity in the claim construction of a given patent); *KX Indus. v. PUR Water Purification Prods., Inc.*, 108 F. Supp. 2d 380, 387 (D. Del. 2000), *aff'd*, 18 F.App'x 871 (Fed. Cir. 2001) ("[T]o the extent the parties do not raise new arguments, the court will defer to its previous construction of the claims.").

The construction adopted in the Micromass litigation is compelled by the specification, as understood by those skilled in the art. There are two corresponding structures identified in the specification for directing the ions though an inlet orifice into

[11] The Court used the statutory language "corresponding structure, material or acts" in its constructions of the means-plus-function limitations in its *Markman* opinion in the Micromass litigation. Therefore, AB/Sciex uses that formulation here.

a first vacuum chamber. The first is the DC potential voltage[12] applied between the inlet orifice and the first rod set in the first vacuum chamber. With reference to the Figure 1 embodiment, the specification recites that "[i]ons produced in the ionization chamber 16 are drifted *by appropriate DC potentials* on plates 22, *28, and on the AC-only rod set 32* through opening 20 and *orifice 26*," into the first vacuum chamber. JA17, 4:38-41 (emphasis added). With reference to the Figure 12 embodiment, the specification states that:

> [i]t was found that with the physical arrangement shown in FIG. 12, the ion to gas ratio entering the AC-only rods 32' increased by a factor of about two to four . . . when an *appropriate DC voltage difference voltage* (preferably about 1 to 15 volts) existed *between skimmer plate 72 and AC-only rods 32'*.

JA20, 9:34-41 (emphasis added).

The other corresponding structure identified in the specification for directing ions though an inlet orifice into a first vacuum chamber is a difference in the pressures on either side of the inlet orifice. The specification discloses repeatedly that pressure differentials exist between the first vacuum chamber and the preceding chambers. For example, Figure 1 shows that a pump 31 is used for evacuating chamber 30. The pump 31 causes a pressure difference between chamber 24 (which is at about atmospheric pressure or slightly higher) and chamber 30. JA17, 4:19-21; JA2, Fig. 1. Similarly, Figure 12 depicts a pressure difference between a rod-less vacuum chamber 70 held at

[12] The corresponding structure for a means-plus-function claim element does not need to be hardware or a solid object. *See, e.g., Fonar Corp. v. General Elec. Co.*, 107 F.3d 1543, 1551-52 (Fed. Cir. 1997) (finding a "generic gradient waveform" to be the corresponding structure); *Altiris, Inc. v. Symantec Corp.*, 318 F.3d 1363, 1377 (Fed. Cir. 2003) (finding "the normal operating system on the computer, another automation operating system, a customized or a normal MBR ["Master Boot Record"], and communications software" each to be the corresponding structures); *Globetrotter Software, Inc. v. Elan Computer Group, Inc.*, 236 F.3d 1363, 1367-70 (Fed. Cir. 2001) (finding a software license file having unique identification data was the corresponding structure).

between 0.4 torr and 10 torr by pump 71 and chamber 30', which typically has a vacuum of 5 to 8 x 10^{-3} torr. JA20, 9:3-4, 13-17, 38-39; JA10, Fig. 12. The specification also teaches that a pressure difference will direct ions, along with neutral gas molecules, to flow through the inlet orifice. For example, the specification states that "[i]t was found that with the physical arrangement shown in Fig. 12, the ion to gas ratio entering the AC-only rods 32' increased by a factor of about two to four . . . when the appropriate *pressures . . . were used* in chamber 30' . . . ." *Id.*, 9:34-39 (emphasis added).

Thermo's proposed construction states that "the corresponding structures include 'curtain gas plate 22,' 'orifice plate 28,' and 'rod set 32.'" D.I. 49, Ex. A at 11. This construction is incorrect for several reasons. First, curtain gas plate 22 is not even involved in the function of directing ions through the inlet orifice. The specification describes a DC potential between curtain gas plate 22 and orifice plate 28 in the embodiment of Figure 1, but that potential directs ions though orifice 20 into the curtain gas chamber 24, *not* through the inlet orifice (orifice 26). In the embodiment of Figure 12, the curtain gas plate 22' is even further removed from the inlet orifice (orifice 76) because there is another vacuum chamber 70 between the curtain gas chamber 24 and the "first vacuum chamber." 35 U.S.C. § 112, ¶ 6, does not "permit incorporation of structure from the written description beyond that necessary to perform the claimed function." *Asyst Techs.*, 268 F.3d at 1369-70 (citing *Micro Chem., Inc. v. Great Plains Chem. Co.*, 194 F.3d 1250, 1257-58 (Fed. Cir. 1999)).

Second, although orifice plate 28 and rod set 32 are involved in one of the corresponding structures as described in one of the disclosed embodiments, *i.e.*, DC voltages are applied to them in the embodiment of Figure 1 to produce a potential difference to cause ions to drift through the inlet orifice, Thermo excludes the analogous

elements in the Figure 12 embodiment, specifically skimmer plate 72 (having an orifice 76) and rod set 32'. AB/Sciex's proposed construction (and the Court's in the Micromass litigation) embraces *both* embodiments in the recitation "the application of appropriate DC potential between *the inlet orifice and the rod set in the first vacuum chamber*."

Third, orifice plate 28 and rod set 32 do not themselves cause ions to enter the first vacuum chamber. DC voltages must be applied to them (or to skimmer plate 72 and rod set 32' in Figure 12) to create the DC potential that *does* cause ions to enter the first vacuum chamber. The corresponding structure must actually perform the recited function. *Asyst Techs.*, 268 F.3d at 1371.

Finally, Thermo omits the alternative corresponding structure identified in the specification: a difference in the pressures on either side of the inlet orifice. The Court concluded in the Micromass litigation that "it is clear from the patent specification that a pressure differential exists between the curtain gas chamber (24) and the first vacuum chamber (30) and that this pressure differential causes the curtain gas to flow through the orifice (26)." *Applera*, 186 F. Supp. 2d at 516-17 (JA514-15). The Court thus correctly identified "a difference in the pressures on either side of the inlet orifice" as alternative corresponding structure. *Id.* at 517-18, 530 (JA515-16; JA528).

B. "Means for Flowing Gas Through Said Inlet Orifice"

Proposed Construction:	*The function of the element is "to flow gas through said inlet orifice and into said first space."* *The corresponding structure, material, or acts described in the specification is the existence of gas in a chamber, separated from the first vacuum chamber by the inlet orifice, at a higher pressure than that in the first vacuum chamber.*

AB/Sciex and Thermo agree that the phrase "means for flowing gas through said inlet orifice into said first space" in element (g) of claim 1 is a means-plus-function

element, and that the recited function is "to flow gas through said inlet orifice and into said first space." However, AB/Sciex and Thermo disagree on the corresponding structure disclosed in the specification.

AB/Sciex's proposed construction was adopted by the Court in the Micromass case, and should be given deference. *Applera*, 186 F. Supp. 2d at 520 (JA518), 530 (JA528); *see also Markman*, 517 U.S. at 391; *KX Indus.*, 108 F. Supp. 2d at 387.

The construction adopted in the Micromass litigation, "the existence of gas in a chamber, separated from the first vacuum chamber by the inlet orifice, at a pressure higher than the pressure in the first chamber," comes directly from the specification. The specification states with reference to the Figure 1 embodiment that the "curtain gas chamber 24 is connected by an orifice 26 in orifice plate 28 to a first vacuum chamber 30 pumped by a vacuum pump 31." JA17, 4:19-21. The specification goes on to state that the "curtain gas flows through orifice 26 into the first vacuum chamber 30 . . . ." *Id.*, 4:32-33. The fact that there is gas in the curtain gas chamber that is at a higher pressure (approximately atmospheric pressure) than the "first vacuum chamber" ("up to between 150 and 200 millitorr") causes gas to flow through the inlet orifice. *Id.*, 4:13-15, 17-19; JA22, 13:65-66. In the Figure 12 embodiment, a vacuum chamber 70 precedes the "first vacuum chamber" 30'. The pressure in vacuum chamber 70 is "between about 0.4 and about 10 torr" and thus higher than the pressure in the "first vacuum chamber" 30'. JA20, 9:14-15. That difference in pressure causes gas to flow through skimmer orifice 76.

Thermo's proposed construction states that the corresponding structures include "curtain gas source 42," "duct 44 to the curtain gas chamber 24," "curtain gas chamber 24," "orifice plate 28," "orifice 26," "vacuum pump 31," and "vacuum chamber 30." D.I. 49, Ex. A at 11. Thermo merely identifies elements in the Figure 1 embodiment that can

enable gas in curtain gas chamber 24 to have a higher pressure than that of the first vacuum chamber 30. However, it is the fact, not the possibility, of gas at a higher pressure that performs the recited function of flowing gas through the inlet orifice. Thermo's proposed construction should be rejected because it "incorporat[es] structure from the written description beyond that necessary to perform the claimed function." *Asyst Techs.*, 268 F.3d at 1369-70. The elements Thermo identifies are not themselves the cause of gas flow though the inlet orifice. That does not occur unless and until the gas in the curtain gas chamber (or in vacuum chamber 70 in the Figure 12 embodiment) is at a higher pressure than the "first vacuum chamber."

C. "Means for Maintaining Kinetic Energies of Ions"

Proposed Construction:	*The function of the element is "maintaining the kinetic energy of ions moving from said inlet orifice to said first rod set at a relatively low level."* *The corresponding structure, material, or acts described in the specification is the application of two variables: (1) a DC potential voltage between the inlet orifice and the first rod set, and (2) the pressure in the first vacuum chamber.*

AB/Sciex and Thermo agree that the phrase "means for maintaining the kinetic energies of ions moving from said inlet orifice to said rod set at a relatively low level" in element (k) of claim 1 is a means-plus-function element subject to 35 U.S.C. § 112, ¶ 6, and that the recited function is "maintaining the kinetic energy of ions moving from said inlet orifice to said first rod set at a relatively low level." However, AB/Sciex and Thermo disagree on the corresponding structure disclosed in the specification.

AB/Sciex's proposed construction was adopted by the Court in the Micromass case, and should be given deference. *Applera*, 186 F. Supp. 2d at 520 (JA518), 530 (JA528); *see also Markman*, 517 U.S. at 391; *KX Indus.*, 108 F. Supp. 2d at 387.

The construction adopted in the Micromass litigation comes directly from the specification, which makes clear that the function of maintaining the kinetic energies of the ions at a relatively low level is accomplished by the application of the proper voltage for a given pressure in the chamber. In particular, the experiments described in the specification demonstrate that the kinetic energies of the ions are *increased* by an increased DC voltage, but are *decreased* by increased pressure in the chamber. With respect to the impact of pressure on kinetic energy, the specification discloses experiments where increasing the pressure of chamber 30 to 5.9 mtorr decreased the kinetic energy of the ions, and where increasing the pressure "to 9.8 millitorr, the . . . maximum energy were reduced even further." JA19, 7:67-8:40. With respect to the impact of the DC voltage, dependent claims 8-10, all of which were present in the original application as filed and thus are part of the specification, require that the means for maintaining "the kinetic energy of said ions" of claim 1 comprises a means for applying a "low DC voltage between said first rod set and said inlet wall." JA23, 15:20-38. Finally, the specification makes clear that there is a relationship between voltage and pressure, and that the appropriate voltage depends upon the pressure. *See*, *e.g.*, JA21, 11:7-12 ("It is found that when the AC-only rod set 32' is operated at a high pressure (e.g. 5 millitorr), with a relatively low DC difference voltage . . . ."). Accordingly, the specification makes clear that applying voltage without regard to the pressure cannot be the structure which corresponds to the recited function, and that the corresponding structure is the application of the proper combination of both voltage and pressure.

Thermo's proposed construction states that the corresponding structures include "curtain gas plate 22," "orifice plate 28," and "rod set 32." This construction is incorrect for several reasons. First, curtain gas plate 22 is not even involved in the function of

maintaining the kinetic energies of ions moving from the inlet orifice to the first rod set at a relatively low level. The specification nowhere associates the curtain gas plate with that function. Indeed, in the embodiment of Figure 12, the curtain gas plate 22' is removed from region between the inlet orifice (orifice 76) and the first rod set by a vacuum chamber 70 between the curtain gas chamber 24 and the first vacuum chamber. 35 U.S.C. § 112, ¶ 6, does not "permit incorporation of structure from the written description beyond that necessary to perform the claimed function." *Asyst Techs.*, 268 F.3d at 1369-70.

Second, although orifice plate 28 and rod set 32 are involved in the corresponding structures as described in one of the disclosed embodiments, *i.e.*, DC voltages are applied to them in the embodiment of Figure 1 to produce a potential difference to affect kinetic energies of ions in the region between them, Thermo excludes the analogous elements in the Figure 12 embodiment, specifically skimmer plate 72 (having an orifice 76) and rod set 32'. AB/Sciex's proposed construction (and the Court's in the Micromass litigation) embraces *both* embodiments in the recitation "a DC potential between *the inlet orifice and the rod set*."

Third, orifice plate 28 and rod set 32 do not themselves maintain kinetic energies of ions in the region between them. DC voltages must be applied to them (or to skimmer plate 72 and rod set 32' in Figure 12) to create the DC potential that *does* affect the kinetic energies of ions in that region. The corresponding structure must actually perform the recited function. *Asyst Techs.*, 268 F.3d at 1371.

Finally, Thermo completely overlooks the effect of pressure in the first vacuum chamber on ion kinetic energies and the interrelationship between the DC potential and pressure in maintaining ion kinetic energies at a relatively low level, as discussed above.

This issue was carefully and thoroughly addressed in the Court's *Markman* opinion in the Micromass litigation. *Applera*, 186 F. Supp. 2d at 526-28 (JA524-26). The construction in that case should be adopted here.

III. DISPUTED TERMS INVOLVING THE PREVIOUSLY DECIDED ISSUE OF WHAT IS A "ROD SET," AND THE ISSUE OF ROD LENGTH

A. "Rod"

Proposed Construction: *An electrode having a length along an ion path that produces an external electrical field over that length when a voltage is applied.*

"Rod" is a technical term that has a specialized meaning in the field of mass spectrometry. "[T]he best source for understanding a technical term is the specification from which it arose, informed, as needed, by the prosecution history." *Phillips*, 415 F.3d at 1315 (citations omitted). The specification of the '736 patent explains that an AC or an AC-DC voltage is applied to the rods so that they may operate either to guide and focus ions, or to filter ions, respectively. JA17, 4:43-50. Figure 13 shows illustrative trajectories of ions (in the absence of collisional focusing) influenced by the electric fields external to rods 32' and along the length dimension, which is along the ion path. JA17, 3:51-52; JA20, 10:52-58. Thus, a person of ordinary skill in the art of mass spectrometry reading the specification would have understood that the "rods" of the invention are electrodes having a length along an ion path and that the application of a voltage produces an external electrical field over the length of the rods that either guides and focuses the ions, or filters the ions.

Thermo proposes a non-technical construction of "rod" to mean "a 'slender bar' that is, in accordance with the meaning of 'slender,' narrow in circumference in proportion to its length, and substantially longer than it is wide." D.I. 49, Ex. A at 4-5. Thermo's abstract and generic dictionary-based construction of "rod" is incorrect because

it fails to account for how a person of ordinary skill in the art would understand that term in light of the specification. Thermo's reliance on the dictionary is twofold: Thermo initially relies on the dictionary both for the meaning of the claim term "rod" ("slender bar") and for the meaning of the word "slender," which is not even a claim term. This impermissibly "elevat[es] the dictionary to such prominence . . . that it focuses the inquiry on the abstract meaning of words rather than on the meaning of the claim terms within the context of the patent." *Phillips*, 415 F.3d at 1321.

Neither the specification nor the prosecution history limits the term "rod" to a "bar," much less one having any minimum length to width ratio. The specification draws a parallel between the structural elements of the Figure 1 embodiment and those disclosed in Figures 13 and 14 of the prior art French '420 patent, stating that they are "essentially the same." JA17, 4:4-7, 51-53. The '420 patent uses the term "rods" to describe two very different structures: "rods" that are solid, similar to those shown schematically in Figures 1 and 12 of the '736 patent (*see* JA108, Fig. 3); and "rods" that each consist of a series of parallel wires, *i.e.*, that have an open structure, unlike what is shown in the '736 patent (JA117, 8:17-31; JA112, Fig. 12 (below)).

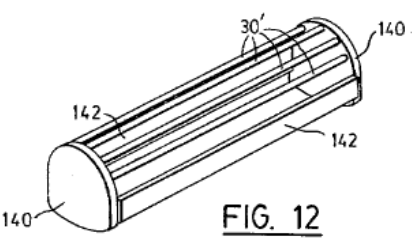


FIG. 12

The inventors' incorporation of the French '420 patent is evidence of what they, and those of ordinary skill in the art, understood "rod" to mean at the time the application was filed. One of ordinary skill would have understood that the term "rod" is not limited to its standard dictionary definition, but instead that in the context of the field of mass spectrometry it encompasses such things as the open structures shown in the '420 patent,

i.e., "groups of open wires or other open structure which produces a quadrupole type field." JA117, 8:47-51 (emphasis added); *see also* JA114, 1:36-37.

The '420 patent also refers to another structure that likewise was referred to by those skilled in the art as a "rod": "It is noted that Brubaker and others have disclosed that *short* AC-only rod sections placed between an ion source and the AC-DC mass filter can improve ion transfer efficiency." *Id.*, 1:47-50. Thus, one of ordinary skill in the art would have understood that "rods" can be "short."

Moreover, the specification of the '736 patent explains that the length of a rod can vary depending on the operating pressure. JA22, 13:20-22 ("by . . . reducing the length of the rod set 32"). Thus, standard dictionary definitions do not apply.

B. "Rod Means"

Proposed Construction:	*"Rod means" means "rods" and therefore requires no construction separate from the construction of "rods."*

Claims 1 and 14 of the '736 patent each recite that each of the first and second rod sets comprise "a plurality of *rod means*." JA22; JA23. Throughout the specification the term "rods" is used, except in the "Background" section where, in summarizing the invention, the claim language "rod means" appears. No differentiation between the terms "rod means" and "rods" is made in the specification or in the original and reexamination prosecution histories. Therefore, "rod means" means just "rods," and there is no need for a construction of "rod means" separate from the construction of "rods."

Thermo incorrectly contends that "rod means" is a means-plus-function limitation subject to 35 U.S.C. § 112, ¶ 6 that should be limited to the corresponding structure of "four 15-cm quadrupole mass spectrometer rods that are not too short." D.I. 49, Ex. A at 5-6. "Rod means" is not a § 112, ¶ 6 element because it is not a purely functional

element. *See Phillips*, 415 F.3d at 1311 ("[m]eans-plus-function claiming applies only to purely functional limitations that do not provide the structure that performs the recited function.").[13]

Thermo's construction seeks to limit the claims to the 15 cm quadrupole rod set used in conducting the experiments disclosed in the '736 patent. Limiting claim terms to examples or preferred embodiments from the specification is improper unless the inventor has specifically so limited his invention through statements in the specification or prosecution history. *See, e.g., Specialty Composites*, 845 F.2d at 987 ("What is patented is not restricted to the examples, but is defined by the words in the claims. . . ."). No such disclaimer exists here. Rather, claim 1 requires "a plurality of elongated parallel rod means" and claim 14 requires "a plurality of rod means . . . defining longitudinally extending first and second spaces." Neither claim recites "quadrupoles," let alone "four 15-cm quadrupole mass spectrometer rods that are not too short."

C. "Rod Set"

Proposed Construction: *Two or more rods*.

The ordinary meaning of the term "rod set" is "two or more rods." That is the construction the Court adopted in the Micromass litigation. *See Applera*, 186 F. Supp. 2d at 508 (JA506) (finding that "rod set" requires "a plurality, meaning two or more, of rods

[13] *See also York Prods. v. Cent. Tractor Farm & Family Ctr.*, 99 F.3d 1568, 1574 (Fed. Cir. 1996) (finding that "means formed on the . . . sidewall portions including . . . ridge members" is not a means-plus-function limitation because the claim language recites structure instead of a function connected to the "means" language); *Wenger Mfg., Inc. v. Coating Mach. Sys., Inc.*, 239 F.3d 1225, 1237 (Fed. Cir. 2001) (affirming that "means defining a plurality of separate product coating zones longitudinally spaced along said reel" is not a means-plus-function limitation because it was unclear that there is any function that corresponds to the word "means," and that, even assuming that the function is "defining," the claim recites sufficiently definite structure for performing the function of "defining").

in each rod set and do [sic] not require a quadrupole").[14]

Thermo proposes a more limiting construction, namely, that "rod set" means "a number of rods of the same kind that belong or are used together, in accordance with the meaning of 'set' which means a number of things of the same kind that belong or are used together." D.I. 49, Ex. A at 4. This proposed construction is yet another attempt to improperly limit the claimed "rod set" to the exemplar quadrupole rod set in the specification. But there is nothing in the claims, specification, or prosecution history which requires a "rod set" to be "rods of the same kind that belong or are used together." The ordinary meaning of the word "set" commonly is not limited to a collection of like items as Thermo argues. A194-95. A "set" of golf clubs includes drivers, irons and a putter. Everything in the set is a golf club, but they are not all the same club. A "set" of tools includes a hammer, a wrench, a screwdriver, etc. Everything in the set is a tool, but they are not all the same tool. In the same way, a "rod set" must be made up of "rods," but the rods need not be the same.[15] Thermo's construction is incorrect.

D. "Elongated"

Proposed Construction: *Having a length that exceeds its width.*

Element (c) of claim 1 recites "a plurality of *elongated* parallel rod means spaced laterally apart a short distance from each other to define an *elongated* space therebetween extending longitudinally through such rod set" (emphasis added). Based on the usage of

[14] The Court refused to import from the specification a limitation that did not exist in the claims and correctly recognized that "the claims of the '736 patent require only a plurality, meaning two or more, of rods in each rod set and do not require a quadrupole." *Applera*, 186 F. Supp. 2d at 508 (JA506).

[15] Moreover, rather than clarify what is meant by "rod set," Thermo's construction injects ambiguity about whether rods are "of the same kind that belong or are used together" and will only confuse a jury. *See Sulzer Textil A.G. v. Pinacol N.V.*, 358 F.3d 1356, 1366 (Fed. Cir. 2004) (a trial court has the obligation to "give the jury guidance that 'can be understood and given effect by the jury once it resolves the issues of fact which are in dispute'" (citations omitted)).

the term in the specification, those skilled in the art would understand that "elongated" means "having a length that exceeds its width."

In Figures 1 and 12, the rods 32, 32' and 40, 40' and the spaces they define are depicted as having lengths that significantly exceed their widths. However, the specification discusses the fact that rod length is variable and can be reduced if the pressure is increased, provided that the "significant parameter," *i.e.*, the product of pressure and length, equals or exceeds 2.25×10^{-2} torr cm. JA22, 13:3-31. In fact, the specification points out that increasing the pressure and reducing rod length has the advantage of reducing the size of the instrument. *Id.*, 13:20-23. Based only on this teaching, one skilled in the art would conclude that there is no minimum rod length and a rod could certainly have a length less than its diameter. However, the term "elongated" would be understood to impose some limitation on rod length versus diameter. Thus, consistent with both the specification's teaching and with the ordinary meaning of "elongated," one skilled in the art would understand that in the context of the '736 patent, "elongated" rods and spaces must at least have a length that exceeds their diameter. This construction comports with AB/Sciex's proposed construction of "rod" (and "rod means"), which by itself implies no length limitation, other than that imposed by practical limitations on how high the pressure can be, e.g., electrical breakdown. *See* JA 22, 13:46-48.

Thermo proposes that "elongated" means "stretched out and having a form notably long in comparison to its width." D.I. 49, Ex. A at 5. This construction is inconsistent with the specification, which teaches that the "significant parameter" is the product of pressure and length, and thus that the AC-only rod set need only be as long as needed to make the P x L product equal or exceeds 2.25×10^{-2} torr cm. JA22, 13:3-31.

Thermo's construction is also vague and will only invite jury confusion. It should be rejected.

E. "Spaced Laterally Apart a Short Distance"

Proposed Construction: *Requires no construction.*

As mentioned above, element (c) of claim 1 recites "a plurality of elongated parallel rod means *spaced laterally apart a short distance* from each other to define an elongated space therebetween extending longitudinally through such rod set" (emphasis added). The ordinary meaning of the phrase "spaced laterally apart a short distance" is clear on its face and requires no construction.

Thermo proposes that this phrase means that "the rod means are separated by a distance substantially less than the length of each elongated rod." D.I. 49, Ex. A at 6. This construction is incorrect because it imposes a correlation between the distance separating the rods and the length of the rods that is not supported or required by the ordinary meaning of the words, the specification, or the prosecution history. Nowhere does the specification discuss any correlation between rod spacing and rod length. Those skilled in the art understand that rod spacing is a function of the voltage applied between the rods and other factors that relate to practical considerations such as effectiveness in confining ions while avoiding electrical breakdown between rods. *See, e.g.*, JA18, 6:19-23; 39-41 ("The diameter of the inscribed circle in the first rod set 32 was 11 mm . . . . This lower q involved operation of the rod set at a lower AC voltage, which reduces the likelihood of electrical breakdown."). The Court should reject Thermo's proposed construction and not limit "spaced laterally apart a short distance" beyond its clear and ordinary meaning.

F. "Space Extending Longitudinally" and "Longitudinally Extending Spaces"

Proposed Construction: *Space that runs lengthwise down the rods.*

Element (c) of claim 1 further recites "each rod set comprising a plurality of elongated parallel rod means spaced laterally apart a short distance from each other to define an elongated *space* therebetween *extending longitudinally* through such rod set" (emphasis added). Likewise, claim 14 recites "said first and second rod sets each comprising a plurality of rod means and defining *longitudinally extending* first and second *spaces*" (emphasis added).

The ordinary meaning of "space . . . extending longitudinally" and "longitudinally extending . . . spaces" is "space that runs lengthwise down the rods." That is what the specification shows in Figures 1, 12 and 13. A standard dictionary definition of "longitudinal" is "placed or running lengthwise." A193. This is consistent with the usage of the term "longitudinally" in the specification and the Figures.

Thermo contends that these terms should be construed to mean "space that runs lengthwise down the rods, and that is longer than it is wide." D.I. 49, Ex. A at 6, 7. The only difference between the parties' constructions is that Thermo adds a requirement that the space must be longer than it is wide. This part of Thermo's construction, however, has no basis in the words "space," "extending," or "longitudinally." (In claim 1, the term "elongated" in reference to the space imposes this limitation.) Since Thermo's additional requirement "that [the space] is longer than it is wide" is not supported by the ordinary meaning or by the intrinsic evidence, it should be rejected.

G. "The Length of Said First Rod Set"

Proposed Construction: *Requires no construction.*

Element (j) of claim 1 recites "the product of the pressure in said first chamber times *the length of said first rod set* being equal to or greater than 2.25 x 10^{-2} torr cm" (emphasis added). Claim 14 has a similar element. The meaning of "the length of said first rod set" is clear on its face and requires no construction.

Thermo contends that this phrase should be defined to mean "the length of the rods in the direction of the longitudinal axis." D.I. 49, Ex. A at 12. This construction begs the question: the longitudinal axis of what? If it is the longitudinal axis of the rods, then Thermo's construction is unnecessary. If it is not the longitudinal axis of the rods, then Thermo's construction is nonsensical, is not supported by the specification or prosecution history, and injects unnecessary confusion. Thermo's construction should be rejected.

IV. DISPUTED TERMS AS TO WHICH THERMO RAISES THE ISSUE OF INDEFINITENESS

A. "Means for Applying Essentially an AC-Only Voltage"

Proposed Construction: *The function of the element is "applying essentially an AC-only voltage between the rods of said first rod set so that said first rod set may guide ions through said first space."*

The corresponding structure, material, or acts described in the specification are the rods of rod set 32 and, as is well known to those skilled in the art, an AC power supply connected to the rods.

The parties agree that the phrase in claim 1 that recites "means for applying essentially an AC-only voltage between the rod means of said first rod set so that the first rod set may guide ions through said first space" is a means-plus-function § 112, ¶ 6

element. However, the parties disagree regarding the function performed by the "means" and the corresponding structure described in the specification.

The disagreement over the recitation of function is a narrow one: whether the term "rods" (AB/Sciex's proposal) or "rod means" (Thermo's proposal) should be used. This is just an echo of the dispute over whether "rod means" is a § 112, ¶ 6 element. Since, as explained above, it is not, but instead simply means "rods," then the use of the term "rods" rather than "rod means" in the recitation of the function will avoid confusion and be helpful to the jury.

The parties have a more fundamental disagreement regarding the issue of corresponding structure. Thermo contends that no corresponding structure is described in the specification and therefore that the claim is indefinite. AB/Sciex contends that the disclosure in the specification of "AC-only quadrupole mass spectrometer rods 32" and that "[a]n AC RF voltage (typically at a frequency of about 1 Megahertz) is applied between the rods of rod set 32, as is well known, to permit rod set 32 to perform its guiding and focussing function" is a more than sufficient description of structure to satisfy the definiteness requirement. JA17, 4:21-23, 43-46.

Under Federal Circuit precedent, AB/Sciex's position is clearly correct. Whether sufficient structure is disclosed in the specification must be determined "based on the understanding of one skilled in the art." *Atmel Corp. v. Info. Storage Devices, Inc.*, 198 F.3d 1374, 1378 (Fed. Cir. 1999). Although the specification must disclose some structure, "the patentee need not disclose details of structures well known in the art." *Default Proof Credit Card Sys., Inc. v. Home Depot U.S.A., Inc.*, 412 F.3d 1291, 1302 (Fed. Cir. 2005). "The law is clear that patent documents need not include subject matter that is known in the field of the invention and is in the prior art, for patents are written for

persons experienced in the field of the invention." *S3 Inc. v. nVIDIA Corp.*, 259 F.3d 1364, 1371 (Fed. Cir. 2001).

In *S3*, the district court granted summary judgment of invalidity of claims directed to an integrated circuit for use in a computer video color display based in part on its conclusion that the specification disclosed no structure corresponding to the recited "means . . . for selectively receiving" either of two video data streams. The only pertinent disclosure in the specification was a single reference to a "selector" in the text and a correspondingly labeled box in one of the figures. *Id.* The Federal Circuit noted that "the electronic structure of the selector and the details of its electronic operation are not described in the specification." *Id.* Nevertheless, the Federal Circuit reversed the grant of summary judgment, relying on evidence in the record "that a selector is a standard electronic component whose structure is well known in this art." *Id.*

The Federal Circuit engaged in a similar analysis in *Atmel*. The claims at issue there were directed to a "charge pump" circuit that included a "high voltage generating means . . . for generating a high voltage from a lower voltage power supply." *Atmel*, 198 F.3d at 1376. The only relevant disclosure in the specification was a "black box" that appeared in two figures, and a citation to a reference in the text. *Id.* at 1377. The district court held that there was insufficient disclosure of structure corresponding to the "high voltage generating means" and granted summary judgment that the claim was invalid for indefiniteness. The Federal Circuit reversed, relying on expert testimony in the record that the title of the publication cited in the specification was by itself "sufficient to indicate to one skilled in the art the precise structure of the means recited in the specification." *Id.* at 1382.

In re Dossel, 115 F.3d 942 (Fed. Cir. 1997), is likewise instructive. The Federal Circuit reversed a Patent Office Board of Appeals decision indefiniteness rejection. The claims were directed to a device for reconstructing the spatial current distribution in, for example, a patient's brain, and included a "means for reconstructing the current distributions of [certain] volume elements." *Id.* at 943. The court did not find any explicit identification of corresponding structure in the specification, but nevertheless reversed the rejection because, it concluded, the corresponding structure "must be" a computer. *Id.* at 946-47. The court further noted that "[w]hile the written description does not disclose exactly what mathematical algorithm will be used to compute the end result, it does state that 'known algorithms' can be used to solve standard equations which are known in the art." *Id.* at 946. Thus, despite the fact that the specification did not explicitly identify a computer as the corresponding structure nor disclose any specific algorithm, the court held that there was sufficient disclosure of corresponding structure because the disclosure of a computer was implicit from the perspective of a person skilled in the art. *Id.*

Here, the structure corresponding to the "means for applying essentially an AC-only voltage between the rod means of said first rod set" is clear in the specification to one skilled in the art. The disclosure in the specification of "AC-only quadrupole mass spectrometer rods 32," and further that "[a]n AC RF voltage (typically at a frequency of about 1 Megahertz) is applied between the rods of rod set 32, as is well known, to permit rod set 32 to perform its guiding and focussing function," is a sufficient description for one skilled in the art to understand that a AC-power supply is coupled to rods 32 in the conventional manner. JA17, 4:21-23, 43-46. The specification itself provides the evidence of what one skilled in the art would understand are "*AC only* quadrupole mass

spectrometer rods." The specification cites Dr. French's '420 patent as describing essentially the same structure and operation as Figure 1. JA17, 4:51-53. The '420 patent includes Figure 6 (below (JA110)) showing AC-only rods with appropriate power coupling, and associated text in columns 6 and 9. JA116, 6:9-18; JA118, 9:56-65.

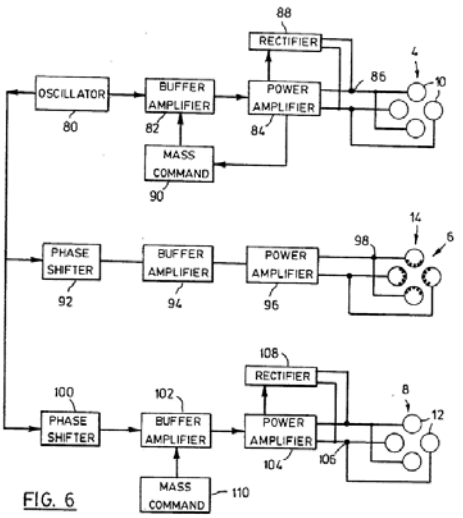


FIG. 6

Indeed, considering the holdings of *S3* (where the term "selector" was by itself sufficient description of corresponding structure) and *Dossel* (where there was no explicit identification of corresponding structure), just the use of the term "*AC only* quadrupole mass spectrometer rods" in the specification is sufficient disclosure of the corresponding structure from the perspective of one skilled in the art. The '420 patent, cited as describing similar structure, provides evidence of what one skilled in the art would understand by the term "AC only quadrupole mass spectrometer rods" in the specification of the '736 patent.

B. "Means for Applying Both AC and DC Voltages"

Proposed Construction: *The function of the element is "applying both AC and DC voltages between the rods of the second rod set so that said second rod set may act as a mass filter for said ions."*

> *The corresponding structure, material, or acts described in the specification are the rods of rod set 40 and, as is well known to those skilled in the art, AC and DC power supplies connected to the rods.*

Thermo raises the same issues with regard to the phrase "means for applying both AC and DC voltages between the rod means of said second rod set so that said second rod set may act as a mass filter for said ions" in claim 1. Again, the parties agree that this is a § 112, ¶ 6 element. Again, Thermo proposes that the recitation of the function include the term "rod means" rather than "rods," as AB/Sciex proposes. Again, Thermo contends that no corresponding structure is described in the specification and therefore that the claim is indefinite. Again, based on Federal Circuit precedent, Thermo's indefiniteness argument is clearly wrong.

The specification states in reference to Figure 1 that "[c]hamber 38 contains a set of four *standard* quadrupole mass spectrometer rods 40" and that "[b]oth DC and AC RF voltages are applied between the rods of rod set 40, so that rod set 40 performs its normal function as a mass filter." JA17, 4:27-28, 46-48 (emphasis added). Again, the specification itself provides evidence of what one skilled in the art would understand to constitute "*standard* quadrupole mass spectrometer rods" through its citation of the '420 patent. Figure 6 of the '420 patent, above, together with the associated text in columns 5, 6 and 9 describes quadrupole rods with AC and DC power coupled appropriately so that the rods act as a mass filter. JA116, 5:59-6:8, JA118, 9:56-59. Under Federal Circuit precedent, including *S3*, *Atmel* and *Dossel*, the identification of "*standard* quadrupole mass spectrometer rods" in the specification is sufficient disclosure of the corresponding structure from the perspective of one skilled in the art.

V. OTHER DISPUTED TERMS

A. "Means for Generating Ions of a Trace Substance"

Proposed Construction: *The function of the element is "generating ions of a trace substance to be analyzed."*
The corresponding structure, material, or acts described in the specification is an electric discharge needle, electrospray source or other ionization source operating at approximately atmospheric pressure.

AB/Sciex and Thermo agree that the phrase "means for generating ions of a trace substance to be analyzed" in element (b) of claim 1 is a means-plus-function element subject to 35 U.S.C. § 112, ¶ 6, and that the function recited is "generating ions of a trace substance to be analyzed." Moreover, the parties agree that the corresponding structure described in the specification is "an electric discharge needle, *electrospray source* or other ionization source operating at approximately atmospheric pressure." D.I. 49, Ex. A at 3 (emphasis added). The dispute arises over Thermo's further inclusion of the phrase "that is not after-developed technology" after identifying the agreed upon corresponding structure.

Thermo seeks to include the legal standard relating to the interpretation of means-plus-function equivalents instead of simply identifying the corresponding structure disclosed in the specification for performing the recited function. It is legally correct that "after-developed technology" does not fall within the scope of § 112, ¶ 6 equivalents for the purposes of literal infringement, and that only the doctrine of equivalents embraces "after-developed technology" for means-plus-function elements. *See Chiuminatta*, 145 F.3d at 1310-11; *Interactive Pictures Corp. v. Infinite Pictures, Inc.*, 274 F.3d 1371, 1381 (Fed. Cir. 2001). However, Thermo's accused instruments use electrospray ion sources.

AB/Sciex does not understand Thermo to contend otherwise. Thus, as far as AB/Sciex is aware, there is no dispute in this case that this claim element is literally met.

Even if Thermo contends that its devices do not literally satisfy this element, the incorporation of a legal standard regarding infringement under the doctrine of equivalents for this element is unnecessary and confusing. Thermo correctly does not propose including the phrase "that is not after-developed technology" in the constructions of any other means-plus-function elements, and it should not be included for this element.

B. "Extending Along at Least a Substantial Portion of the Length"

Proposed Construction: *A portion that is significant for purposes of avoiding scattering and losses of ions within the chamber.*

Element (c) of claim 1 recites "a first rod set in said first vacuum chamber extending along at least a substantial portion of the length of said first vacuum chamber." The dispute here relates to the word "substantial." AB/Sciex proposes that "substantial portion" means "a portion that is significant for purposes of avoiding scattering and losses of ions within the chamber." This construction is supported by the specification, which states:

> In all cases in which the relatively high pressures described are used, the AC-only rods should occupy substantially all or at least a substantial portion of the length of chamber 30, 30'. If they do not, scattering and losses will occur in the portion of these chambers in which the ions are not guided by the AC-only rods.

JA22, 14:4-9. This passage sets forth a functional definition of what is "substantial" in this context, that is, the "first rod set" must occupy a sufficient length of the ion guide chamber to allow the rod set to guide the ions and to avoid scattering and losses of ions.

Thermo proposes that "extending along at least a substantial portion of the length of said first vacuum chamber" means "having a length extending at least most of the

length of the first vacuum chamber." D.I. 49, Ex. A at 5. This construction is incorrect because it disregards the specification. The specification draws a clear connection between the extent of the rods and the avoidance of scattering and losses. It is this functional consideration that defines what "a substantial portion" is. *See Phillips*, 415 F.3d at 1315 ("the best source for understanding a technical term is the specification from which it arose" (citations omitted)). Moreover, the specification differentiates between "substantially all" and "a substantial portion" in reference to the extent of the rod set within the chamber. "A substantial portion" logically is less than "substantially all."

C. "Essentially an AC-Only Voltage"

Proposed Construction: *Allows for some DC component.*

In the phrases "essentially an AC-only voltage" and "an essentially AC-only RF voltage," the key word is "essentially." AB/Sciex proposes that "essentially" in the context of these phrases should be construed to allow for some DC voltage component. This construction is supported by the specification and by the ordinary meaning of the term "essentially." The specification includes the following passage:

> It is noted that although in the system described, the only voltage applied between the rods 32 is an AC voltage, it may be desired in some cases to place a small DC voltage between the rods 32. In that case the rods 32 would act to some extent as a mass filter. However the voltage between rods is preferably essentially an AC-only voltage.

JA21-22, 12:64-13:2. This passage states three things about the application of voltage between the rods of the first rod set. First, in the "system described," the *only* voltage applied between rods 32 is AC, *i.e.*, there is *no* DC voltage applied between rods 32 at all. Second, it may be desired to apply a small DC voltage between rods 32, in which case rods 32 would act to some extent as a mass filter. Third, the voltage between rods 32 is preferably *essentially* an AC-only voltage. By qualifying the phrase "an AC-only

voltage" with the term "essentially," the inventors allowed some leeway by not ruling out application of some DC voltage between rods.

This is consistent with the ordinary meaning of the term "essentially." "Essentially" means "basically." A191. It allows for small deviations that do not change the basic nature of a thing.[16] Thus, the phrase "essentially an AC-only voltage," as such, allows for some DC component. Within the context of the entire limitations in claims 1 and 14 quoted above, which require that the first rod set act as an ion guide, the phrase allows for some DC component that does not change the basic nature of the first rod set as an ion guide.

Thermo proposes that "essentially an AC-only voltage" be construed to mean "a voltage between the rod means that is essentially AC-only RF voltage and that lacks any placed DC component that would cause the rod set to act as a mass filter." There are two problems with this construction. First, it is circular. It construes the key term "essentially" by merely repeating the term. Second, it includes the unnecessary negative limitation that there be no DC component that would cause the rod set to act as a mass filter. As noted above, the language of the pertinent limitations of claims 1 and 14 as a whole requires that the first rod set act as an ion guide. If there is a DC component of the voltage between the rods of the first rod set such that the rod set does not act as an ion guide, the "essentially an AC-only voltage" limitation is not met. There is no reason to add to the construction that the first rod set does not act as a mass filter.

[16] *See, e.g., Glaxo Group Ltd. v. Ranbaxy Pharms., Inc.*, 262 F.3d 1333, 1336 (Fed. Cir. 2001) ("essentially free from crystalline material" construed based on the intrinsic evidence to mean a maximum of less than 10%); *Zenith Lab. v. Bristol-Myers Squibb Co.*, 19 F.3d 1418, 1424 (Fed. Cir. 1994) ("the term 'essentially' recited in the claims permits some leeway in the exactness of the comparison"); *Bailey v. Dunkin Donuts, Inc.*, 1998 U.S. App. LEXIS 1175 *13 (Fed. Cir. 1998) ("essentially vertical" construed to mean "vertical or a few degrees from vertical").

D. "Mass Filter"

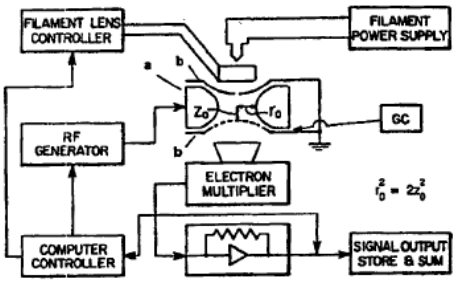
Proposed Construction: *A device that passes through ions of one or more mass to charge ratios while filtering out ions of all other mass to charge ratios.*

"Mass filter" is a technical term, the meaning of which is clear to one skilled in the art from the specification. "The best source for understanding a technical term is the specification from which it arose, informed, as needed, by the prosecution history.'" *Phillips*, 415 F.3d at 1315. The specification states that "a mass filter rod set . . . permits transmission only of ions of a selected mass to charge ratio." JA16, 1:10-12. Similarly, with reference to the preferred embodiments, the specification states that "rod set 40 performs its normal function as a mass filter, allowing only ions of selected mass to charge ratio to pass therethrough for detection by ion detector 48." JA17, 4:48-50. Accordingly, based on the specification, AB/Sciex proposes that the term "mass filter" be construed to mean "a device that passes through ions of one or more mass to charge ratios while filtering out ions of all other mass to charge ratios."

Thermo's proposed construction is substantially the same as AB/Sciex's except for one glaring difference. Thermo adds the negative limitation "and which does not act as an ion trap." Thermo's agenda is to obtain a construction that, it will argue, excludes the "linear ion trap" mass filter in its accused LTQ instruments. The term "ion trap" does not appear in the specification or the original prosecution history. Thermo relies on statements by MDS during the reexamination, but those statements do not provide a basis for adding this limitation to the construction of the term "mass filter."

As explained above, in the Reexamination Request, MDS distinguished four prior art references (Schaaf, Vedel, the Stafford article and the Stafford application) that disclose three dimensional quadrupole ion traps. Figure 1 of the Stafford article

(reproduced below, left) shows the basic structure of the ion traps disclosed in these four references, which consists of a ring (a) and two end caps (b). JA257. The "linear ion trap" in Thermo's LTQ instruments is, in contrast, a "rod assembly," as shown in Figure 2-10 from an LTQ manual (reproduced below, right) A92.



g.1. Schematic diagram of the Ion Trap Detector. The ring electrode, and e end cap electrodes are labelled 'a' and 'b' respectively.

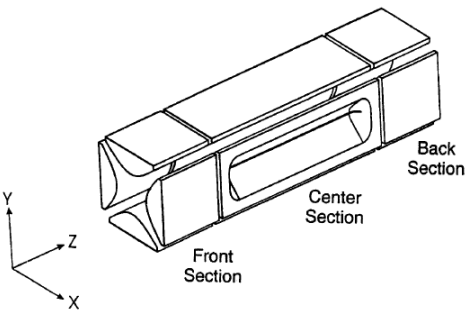


Figure 2-10. Linear ion trap quadrupome rod assembly

As explained above, MDS distinguished the ion trap references on the following grounds, among others: (1) the prior art ion traps operate differently from the ion guide ("first rod set") of the invention because they perform a trapping function and the claimed ion guide does not; and (2) the prior art ion traps differ structurally in numerous respects from the claimed mass spectrometer system. MDS did *not* distinguish the prior art on the basis that the claimed mass filter ("second rod set") does not trap ions.

With regard to Schaaf, MDS first stated that "Schaaf's ion trap operates on a fundamentally different principle that the claimed mass spectrometer" and explained that "[w]ith an ion trap, ions of a selected range of mass to charge ratios are trapped or stored for a period of time (which can be quite lengthy) due to electric fields generated with electrodes." JA173. In distinguishing the claimed mass spectrometer from Schaaf on the basis on Schaaf's trapping function, MDS argued narrowly that the claimed ion guide,

i.e., the "first rod set," does not trap ions.[17] MDS did *not* argue that the claimed mass filter, *i.e.*, the "second rod set," does not trap ions. MDS stated:

> *The invention of the '736 patent relates to an ion transmission rod set in a mass spectrometer.* The claimed mass spectrometer system has a first rod set in a first vacuum chamber and a second rod set in a second vacuum chamber. The *first rod set* receives essentially only an AC voltage so that ions are guided through the first vacuum chamber *without being trapped there*, while the second rod set receives both AC and DC voltages so that the second rod set may act as a mass filter.

JA174-75 (emphasis added). MDS also distinguished Schaaf on the basis that Schaaf did not disclose numerous structural features of the claims:

> Shaaf therefore differs from the invention in that, for instance, it does not disclose or suggest the first and second vacuum chambers, the first and second rod sets, the inlet orifice, the interchamber orifice, the application of AC-only voltage to the first rod set, and the application of AC and DC voltages to the second rod set.

JA175. Here, again, MDS did not argue that the claimed "second rod set" differs in that it does not trap ions.

MDS made similar arguments regarding Vedel, the Stafford article and the Stafford application. In distinguishing Vedel, MDS referred back to its argument concerning Schaaf, stating: "The ion trap, *as described above*, operates on a fundamentally different principle than the mass spectrometer system according to the invention." JA176 (emphasis added). MDS also pointed to the same structural differences as those cited in distinguishing Schaaf. *Id.* MDS made the same structural arguments with regard to the Stafford article and Stafford application. JA177-79. MDS did not distinguish the claims over any of these three references on the basis that the claimed "second rod set" does not trap ions.

[17] In the Micromass case, the Court held that this argument did not rule out trapping of some ions for some length of time in the "first rod set." *Applera*, 186 F. Supp 2d at 519 (JA517).

In short, Thermo's citation to the Reexamination Request does not support inclusion of the limitation "and which does not act as an ion trap."[18]

E. "Very Low Pressure for Operation of Said Second Rod Set as a Mass Filter" and "Substantially Lower Pressure . . . for Effective Mass Filter Operation"

Proposed Construction: *"Very low pressure for operation of said second rod set as a mass filter"—A pressure at which the second rod set will operate as a mass filter.*

"A substantially lower pressure than that of said first chamber, for effective mass filter operation of said second rod set"—A pressure that is sufficiently lower than that of the first chamber such that the second rod set will operate as a mass filter.

AB/Sciex's proposed constructions are based on the words of the claims. "Quite apart from the written description and the prosecution history, the claims themselves provide substantial guidance as to the meaning of particular claim terms." *Phillips*, 415 F.3d at 1314; citing, *inter alia, ACTV, Inc. v. Walt Disney Co.*, 346 F.3d 1082, 1088 (Fed. Cir. 2003) ("the context of the surrounding words of the claim also must be considered in determining the ordinary and customary meaning of those terms"). The words of the claims explicitly set forth a functional definition of what constitutes a "very low pressure" and "a substantially lower pressure", namely, a pressure that is low enough "for operation of said second rod set as a mass filter" (claim 1) or "for effective mass filter operation of said second rod set" (claim 14). *See, e.g., Mars, Inc. v. H.J. Heinz Co.*, 377

[18] In the Micromass case, the Court held that AB/Sciex was estopped from asserting that the '736 patent claims cover the prior art three dimensional ion traps under the doctrine of equivalents. The Court made it clear that the estoppel arose from the "structural arguments" made to distinguish the ion trap prior art in the reexamination, and that the scope of the estoppel was limited to "the structure of the prior art presented." *Applera*, 204 F. Supp. 2d at 773-74 (JA578-79). The Court characterized the prior art ion trap structure as a "non-rod set structure." (The "linear ion trap" in the Thermo LTQ instruments is, on the other hand, a rod set.) At most, on the basis of the Court's estoppel holding, the construction of "mass filter" might include the limitation "and which is not a ring and end cap structure ion trap." However, the inclusion of such a limitation would be academic, because Applera does not seek to cover any ring and end cap ion trap structures.

F.3d 1369, 1373-74 (Fed. Cir. 2004) (stating that the court must "begin … claim construction analysis with the words of the claim itself" and holding that "the term 'ingredients' must be read in context of the claims' reference to 'a mixture of lipid and solid ingredients'"); *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1355-56 (Fed. Cir. 1999) (holding that the term "discharge rate" is defined by the clear language of the claims).

The specification states with reference to the preferred embodiments that "it is advantageous that the pressure in vacuum chamber 38 containing the mass spectrometer rods 40 be very low, *e.g., between 2 x* 10^{-5} *and 1 x* 10^{-6} *torr or less.*" JA17, 4:53-56. Thus, the specification cites pressures between 2 x 10^{-5} and 1 x 10^{-6} torr and lower as *examples* of "very low" pressures. In the Micromass litigation, Micromass asked the Court to construe the terms "very low pressure" and "substantially lower pressure" as limited to a pressure of 2 x 10^{-5} torr or lower. The Court rejected the notion that these terms require "any particular maximum pressure" and held that the terms required no further construction. *Applera*, 186 F. Supp. 2d at 520-21 (JA518-19).

Thermo proposes that "a very low pressure" and a "substantially lower pressure" be construed to mean that "the pressure in the second chamber is at least below 1 x 10^{-5} torr." Thus, Thermo's construction is similar to that proposed by Micromass (and rejected by the Court), except that Thermo sets the maximum pressure at half the value Micromass proposed. Thermo cites pages 11-12 of the Request for Reexamination as support for its numerical maximum. D.I. 49, Ex. A at 11-12. Two prior art references are discussed at these pages—the Stafford application and the French application. In reference to the Stafford application, MDS stated:

> Although the Stafford application does disclose the use of a buffer gas at a *range of pressures from 0.01 to 100 millitorr*, the Stafford application

> does not suggest that a first vacuum chamber have a product of the pressure and length of the first rod set equal to or greater than 2.25 x 10^{-2} torr cm and *does not disclose or suggest that the second vacuum chamber be operated at a very low pressure*.

JA178-79 (emphasis added). This statement contrasts the *range* of pressures taught by Stafford with the product of pressure and rod length in the claimed first vacuum chamber and the very low pressure of the second vacuum chamber. MDS argued here that Stafford does not teach that the pressure must be very low in the second vacuum chamber because he suggests that one can use pressures that are as high as 100 millitorr (five orders of magnitude higher than the lowest pressure in his range) – a pressure that is far above what would enable operation of the second rod set as a mass filter. Because Stafford teaches that such pressures are allowable, he does not teach that one *must* use very low pressure in the second chamber. MDS did *not* argue that *no* pressure within Stafford's range is very low. Thus, any reliance by Thermo on this argument as a disclaimer of pressures above 1 x 10^{-5} torr is misplaced.

With regard to the French application, MDS stated:

> The French application states that the "gas pressure in the first and third quadrupole sections 4, 8 must be *low, typically 10^{-5} torr or less for proper quadrupole operation*."

JA179. Here, MDS merely reported what French says and made no comparison with the claimed invention. Moreover, the statement MDS quoted from French says the pressure is "*typically* 10^{-5} torr or less," not that it must be 10^{-5} torr or less. Thus, any reliance by Thermo on this argument as a disclaimer of pressures above 1 x 10^{-5} torr is also misplaced.

F. "Whereby to Provide Improved Transmission of Ions Through Said Interchamber Orifice"

Proposed Construction: *Increased transmission of the ions through the interchamber orifice over that which would occur absent either a product of pressure in the first chamber times length of the first rod set being equal to or greater than 2.25 x 10^{-2} torr cm, or the kinetic energies of ions entering the first rod set being maintained at a relatively low value.*

Element (k) of claim 1 recites "whereby to provide improved transmission of ions through said interchamber orifice." Claim 14 has a similar limitation. AB/Sciex's proposed construction of the "improved transmission" limitation would require that the ion transmission achieved by using the claimed high pressure and low kinetic energy must be improved over the ion transmission that would be achieved by not using one or both of the claimed high pressure and low kinetic energy. This construction is compelled by the claim language and the teachings of the specification, and also is consistent with MDS's statements during the reexamination.

AB/Sciex's proposed construction is consistent with the specification, which teaches that ion transmission is improved by operating the ion guide at a higher pressure (where the P x L equals or exceeds 2.25 x 10^{-2} torr cm) *and* at a low DC voltage to maintain low ion kinetic energy. *See* JA18, 5:41-6:10; JA21, 11:7-12; JA21, 12:3-15, 30-63. It is this *combination* of parameters that produces collisional focusing of the ions into a narrow beam and thereby results in improved ion transmission. *Id.*

AB/Sciex's proposed construction is also consistent with the claim language, which expressly links the claimed improved ion transmission to these two operating parameters. Element (j) of claim 1 and element (f) of claim 14 recite that the P x L product must equal or exceed 2.25 x 10^{-2} torr cm. Element (k) of claim 1 and element (h) of claim 14 recite that the kinetic energy of the ions must be kept relatively low. After

reciting these two operating parameters, both claims recite "whereby to provide improved transmission of said ions through said interchamber orifice," thereby tying this claimed result back to these two parameters.

AB/Sciex's proposed construction is also consistent with MDS's statements during the reexamination that the improved ion transmission of the invention is due to both increased pressure and low kinetic energy. For example, MDS distinguished Schaaf by emphasizing that it did not "suggest[] that the use of both relatively low energy ions and an increased pressure would have the effect of improving ion transmission." JA154. MDS also distinguished the French application in this manner:

> The French application would therefore teach away from the invention since it collides ions at high kinetic energies into a high pressure region to dissociate the ions into daughter ions, which is *in contrast to the invention which uses low kinetic energy and an increased pressure to produce an improved transmission of ions* entering the device.

JA180 (emphasis added).

Thermo's proposed construction is "[t]ransmission of [said] ions that is better than that which would occur at a pressure-times-length value for the first chamber and first rod set below 2.25 x 10^{-2} torr cm." D.I. 49, Ex. A at 13-14. Thus, Thermo's proposed construction uses only the P x L product as the benchmark for comparison of improved ion transmission, not both the P x L product and low kinetic energy. This construction is incorrect because it ignores the teaching of the '736 patent that improved ion transmission is not due simply to increased pressure, but instead due to the combination of increased pressure and low kinetic energy. As explained above, this is made clear by the claim language, the specification and MDS's arguments during the reexamination.

Moreover, the Federal Circuit has already rejected a construction of "improved transmission" that is virtually identical to Thermo's proposed construction. In the Micromass case, Micromass argued on appeal that this limitation should be defined to mean that "one practicing the invention must realize improved ion transmission through the interchamber orifice relative to the number of ions that would be transmitted without practicing the PL product of the invention." A158-68. In response, AB/Sciex argued, as it does here, that Micromass's proposed construction was incorrect because it ignored the teaching of the '736 patent that improved ion transmission results from the combination of increased pressure *and* setting the DC voltage low enough to maintain low ion kinetic energy. A234-38. The Federal Circuit implicitly rejected Micromass's proposed construction by affirming the judgment below. *Applera*, 60 Fed. App'x 800 (JA590). The Court should give deference to that ruling under the doctrine of *stare decisis*.

PART II – THERMO'S TANG '784 PATENT (C.A. 05-110-GMS)

STATEMENT OF FACTS

A. The '784 Patent and its Technological Background

Thermo's '784 patent also relates to mass spectrometers of the same type described in the much earlier '736 patent, specifically, quadrupole mass spectrometers having an "atmospheric pressure ion" or "API" source. JA601, 1:12-14. In fact, the '736 patent is cited in the specification of the '784 patent. JA601, 2:4-8. In an API source, ions are generated at atmospheric pressure from a liquid that contains the sample to be analyzed as well as a relatively large amount of solvent. Due to the presence of solvent, sometimes "solvent adduct ions" – an association between sample ions and solvent molecules – form in the higher pressure regions of the mass spectrometer, such as the source or the intermediate vacuum chambers. JA601, 2:52-55; JA603, 5:11-13. "The

formation of adduct ions significantly reduces the abundance of sample analyte ions which reach the analyzer." JA603, 5:14-16. Furthermore, the adduct ions which enter into the mass analyzer complicates the mass spectrum and make the identification of mass peaks more difficult." JA601, 2:58-60; JA603, 5:11-19. Accordingly, at some point before the mass analyzer, the adduct ions must be converted into sample ions. Solvent molecules may be removed from adduct ions through a process referred to as "collision induced dissociation" or "CID," that is, the breakup of solvent molecules from adduct ions through collisions with other ions or neutral gas molecules. JA602, 3:32-38.

The '784 patent addresses the known problem of formation of adduct ions in a known mass spectrometer architecture: "a mass spectrometer system employing an ion source with multiple ion guides …" JA601, 2:25-29, 64-66. The ion guides are "configured and operated to convert adduct ions into sample ions and a method of operating multiple ion guides to convert adduct ions into sample ions to thereby increase the analyte ions current and sensitivity of the mass spectrometer system" is provided. JA601-02, 2:64-3:3. The claimed invention of the '784 patent can be understood by reference to Figure 1, which represents a schematic cross-section of a preferred embodiment of the claimed mass spectrometer.

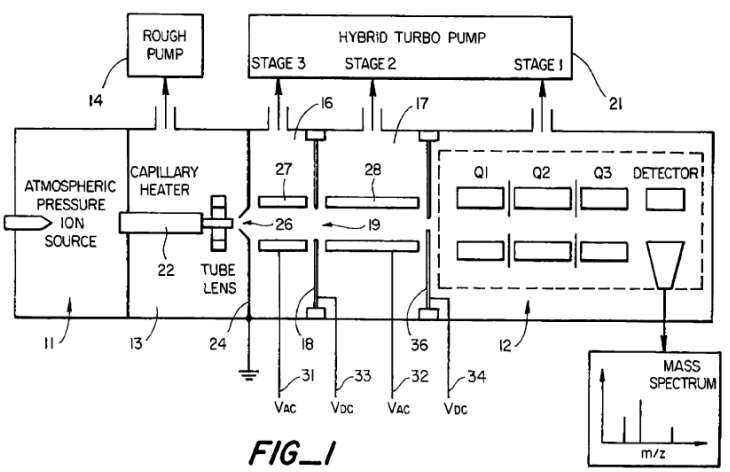


FIG_1

Starting on the left end of Figure 1, the atmospheric pressure ion source generates ions from a sample in atmospheric pressure chamber 11. The sample ions (and solvent adduct ions) are transported through regions of decreasing pressure, *i.e.*, through vacuum chambers 13, 16, 17, and 12, respectively, each of which is evacuated by a pump to less than atmospheric pressure. Vacuum chambers 16 and 17 are ion guide chambers; each contains a "multipole" ion guide, or AC-only rod set, in the terminology of the '736 patent. The patent specifies the ranges of pressures used in the two ion guide chambers. JA602, 4:46-49; JA603, 6:46-49. Vacuum chamber 12 is a mass analyzer chamber, which, in this case, contains a "tandem" mass analyzer. A conical skimmer 24 separates vacuum chamber 13 from vacuum chamber 16. An interchamber lens 18 separates vacuum chamber 16 from vacuum chamber 17. A lens 36 separates vacuum chamber 17 from the mass analyzer chamber 12. JA602-03, 4:32-5:10.

The '784 patent explains that solvent adduct ions are converted into sample ions in the second ion guide (*e.g.* chamber 17) by controlling the kinetic energy of the ions such that they have enough kinetic energy in the second ion guide to dissociate the solvent molecules through collisions with neutral gas molecules or other ions in the second ion guide, but without fragmenting the sample ions themselves:

> A DC voltage source is connected to provide a potential difference between the first lens and the first multipole ion guide or between interchamber lens and the second multipole ion guide or both which defines the ion's translational kinetic energy as it enters the second multipole ion guide. The ion's translational kinetic energy is chosen such that at the vacuum pressure of the second interface chamber adduct ions are converted into sample ions by collision induced dissociation without fragmentation of sample ions . . . .

JA602, 3:27-35, 50-57; JA603, 5:20-31. That is, the application of a DC potential difference between the ion lens preceding either the first or second multipole ion guide (*e.g.* between skimmer 24 and ion guide 27, or between lens 18 and ion guide 28), or

simultaneously between each lens and its respective multipole ion guide, provides the adduct ions with translational kinetic energy, such that at the pressure of the second chamber, the adduct ions are converted into sample ions by CID without fragmentation of sample ions, thereby increasing the sample ion current of the mass spectrometer system.

B. The Original Prosecution of the '784 Patent

The '784 patent issued on March 4, 2003, from an application filed on November 16, 2000, which was a continuation-in-part of an abandoned application filed on December 3, 1999. The CIP application contained nine claims: independent claims 1, 3, 4 and 9; dependent claim 2 (which depends from claim 1); and dependent claims 5-8 (which directly or indirectly depend from claim 4). Claim 1 is an apparatus claim to a mass spectrometer system and claims 3, 4 and 9 are claims to methods of analyzing ions in a mass analyzer and/or methods of operating a mass spectrometer.

In the first Office Action, all nine claims were rejected as anticipated by or obvious in view of U.S. Patent No. 5,652,427, to Whitehouse *et al.* ("Whitehouse"). In rejecting claims 1-4 and 9, the examiner found that Whitehouse disclosed all of the structural features of the claimed mass spectrometer. JA855-56. In response to the Office Action, the applicants admitted that Whitehouse disclosed all the structural features of the invention, but distinguished Whitehouse on the basis that it does not teach the conversion of adduct ions to sample ions without fragmentation of sample ions, with a resulting increase in the sample ion current:

> Applicants have carefully studied U.S. Patent 5,652,427 and admit that this patent shows a mass analyzer disposed in a high vacuum chamber for analyzing ions formed at or near atmospheric pressure and directed to the analyzer through intermediate vacuum chambers, and that the sample ions travel through the chambers without fragmentation.
>
> Applicants' invention, however, is directed to the dissociation of adduct ions prior to entry into the mass analyzer, whereby they form

> sample ions which increase the sample ion current entering the mass analyzer. There is no teaching in this patent, nor would it have been obvious to one with ordinary skill in art at the time of the invention, to modify the Whitehouse patent in the manner required by the present claims. There is no teaching of disassociating adduct ions to form sample ions which together with those sample ions which are not adducted with solvent molecules increases the ion current.

JA930. Further, the applicants amended the independent claims on the basis of this distinction and explained that:

> Claim 1 clearly specifies this feature by calling for means associated with first and second multiple ion guides converting adduct ions into sample ions without fragmentation of the remaining sample ions whereby to increase the sample ion current.

JA930-31.

On September 6, 2002, in response to the amendments and representations made by the applicants, the examiner allowed claims 1-9. JA936-37. The '784 patent issued on March 4, 2003.

C. The Further Prosecution of the '784 Patent

1. Thermo's Reissue Application for the '784 Patent is Pending Before the Patent Office

On March 4, 2005, after filing the present action, Thermo filed an application to reissue the '784 patent, claiming that "the original patent [is] wholly or partly inoperative or invalid . . . by reason of the patentee claiming . . . less than he had the right to claim in the patent." A285. Thermo thus seeks to add broader claims to the patent.

On July 29, 2005, AB/Sciex filed a protest of Thermo's reissue application with the Patent Office on the basis that all claims presented in the application are unpatentable in view of the prior art. The Patent Office has not yet taken any action on the merits of Thermo's reissue application.

2. The Patent Office Is Currently Reexamining the '784 Patent

On September 16, 2005, AB/Sciex filed a request for reexamination of the '784 patent on the basis that all the claims are unpatentable in view of several prior art references, which, except for one, were not before the Patent Office during the original prosecution. On November 4, 2005, the Patent Office granted AB/Sciex's reexamination request, holding that the references cited by AB/Sciex raise substantial new questions of patentability as to all nine claims of the '784 patent. A321-331. The Patent Office also concluded *sua sponte* that Whitehouse in combination with a reference cited by AB/Sciex raised a substantial new question of patentability. Thus, the Patent Office will be reexamining the patentability of all claims of the '784 patent.

On November 18, 2005, AB/Sciex filed motion to stay this case pending disposition of the reexamination. D.I. 42.

ARGUMENT

A. "Mass Analyzer"

Proposed Construction: *A device that sorts ions according to their mass to charge ratio and detects them.*

The term "mass analyzer" appears in the phrase "[a] mass spectrometer system including a mass analyzer disposed in a high vacuum chamber for analyzing sample ions formed at atmospheric pressure" in the preamble of claim 1, and in the phrase "[t]he method of operating a mass spectrometer system including a mass analyzer which analyzes sample ions formed at atmospheric pressure" in the preamble of claim 4. JA604, 7:12-14, 8:1-3. "Mass analyzer" is a technical term. According to a primer on mass spectrometry published by the American Society of Mass Spectrometry ("ASMS"), "[t]he analyzer uses dispersion or filtering to sort ions according to the mass to charge ratios." A341. AB/Sciex's proposed construction tracks this straightforward definition.

AB/Sciex also includes in its proposed construction that the "mass analyzer" detects ions. The ASMS primer does not include the detecting function in its definition of "mass analyzer. Thus, the principal issue here is whether a mass analyzer, as the term is used in the '784 patent, performs the function of detecting ions.

AB/Sciex's inclusion of the detecting function in its proposed construction is based on the text of the specification and Figure 1. "[T]he best source for understanding a technical term is the specification from which it arose, informed, as needed, by the prosecution history." *Phillips*, 415 F.3d at 1315 (citations omitted). The specification describes Figure 1 as "a schematic view of a mass spectrometer system including an atmospheric pressure ion source coupled to a tandem mass analyzer through evacuated interface chambers with multipole ion guides." JA602, 3:64-67. In identifying the various components of Figure 1, the specification states that "an atmospheric pressure ion source in chamber 11 is interfaced to a tandem *mass analyzer 12* via three vacuum pumping stages." JA602, 4:32-34 (emphasis added). Figure 1 plainly shows a "DETECTOR" as part of mass analyzer 12. JA593, Fig. 1. Thus, the inventors have specially defined the term "mass analyzer" in the '784 patent as including the function of detecting as well as sorting the ions, and their definition is controlling. *Phillips*, 415 F.3d at 1316 ("[O]ur cases recognize that the specification may reveal a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess. In such cases, the inventor's lexicography governs."); *see also Rexnord Corp. v. Laitram Corp.*, 274 F.3d 1336, 1342 (Fed. Cir. 2001); *Johnson Worldwide Assoc., Inc. v. Zebco Corp.*, 175 F.3d 985, 990 (Fed. Cir. 1999).

Thermo proposes that "mass analyzer" be construed to mean "any device usable either to deliver ions to another structure selectively, or to detect ions selectively, based

on mass to charge ratios." D.I. 38, Ex. A at 15. This construction should be rejected for two reasons. First, although the first part – "deliver ions to another structure selectively . . . based on mass to charge ratios" – includes in the word "selectively" the concept of ion sorting in accordance with mass to charge ratios, it is cumbersome as compared with the ASMS definition. Also, the reference to "delivery to another structure" is confusing. Second, the requirement that a mass analyzer is "usable *either* to deliver ions . . . *or* to detect ions" is inconsistent with the inventors' definition of a mass analyzer as including a detector.

B. "Adduct Ion(s)"

Proposed Construction: *Ions formed by a non-covalent association between sample ions and solvent molecules.*

The term "adduct ions" appears in the phrase "sample ions and solvent molecules form adduct ions" in the preamble of claim 1, and in the phrase "some sample ions and solvent molecules combine to form adduct ions" in the preamble of claim 4. JA604, 7:16, 8:3-4.

AB/Sciex's proposed construction should be adopted by the Court because it mirrors the language of the patent's specification. In *Phillips*, the Federal Circuit emphasized the importance of the specification by reiterating its prior statement that "the specification . . . 'is the single best guide to the meaning of a disputed term.'" 415 F.3d at 1315 (citing *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)).

In the '784 patent, the patentees provided a general understanding of the process of solvent adduction in the "Background of the Invention," and explicitly defined the process as "a non-covalent association between sample ions of interest and neutral solvent molecules." JA601, 2:39-42. This definition is further reinforced by the repeated

usage of the same language in the claims of the '784 patent. JA604, 7:16 ("sample ions and solvent molecules form adduct ions"); *id.*, 7:42-43 ("some sample ions and solvent molecules combine to form adduct ions"); *id.*, 8:3-4 ("some sample ions and solvent molecules combine to form adduct ions"). Thus, a person having ordinary skills in the art reading the specification of the '784 patent, followed by its claims, would understand that the term "adduct ion" means the result of "a non-covalent association between sample ions and solvent molecules," as proposed by AB/Sciex.

Thermo's proposed construction, namely that an adduct ion is "an ion formed by combining two or more different kinds of particles," seeks to broaden the term beyond combinations of sample ions and solvent molecules. It is not supported by either the specification or the prosecution history of the '784 patent, and it ignores the explicit definition of "adduct ions" in the specification, contrary to Federal Circuit precedent.

Further, Thermo's construction is at odds with the prosecution history. In their June 11, 2002 Amendment, the inventors described the process of solvent adduction in virtually the same language as that used in the specification: "the non-covalent combination of sample ions of interest and neutral solvent molecules." JA930.

C. "Multipole Ion Guide"

Proposed Construction: *A rod set to which an AC voltage is applied that confines ions radially along a longitudinal path.*

The term "multipole ion guide" appears in the phrase "a first multipole ion guide in the first chamber for guiding ions into said second chamber, a second multipole ion guide in the second chamber for guiding ions from the first chamber into the high vacuum chamber for mass analysis" in claim 1, and in the phrase "system including first and second multipole ion guides disposed in serial first and second evacuated chambers" in the preamble of claim 4. JA604, 7:21-25, 8:5-8. AB/Sciex's proposed construction

defines the structure of a "multipole ion guide" (it is a rod set to which an AC voltage is applied) and its function (it confines ions radially along a longitudinal path). D.I. 38, Ex. A at 15. Both aspects of this definition are supported by the specification of the '784 patent.

The "Background of the Invention" section of the specification discusses several prior art references, including the '736 patent. According to the specification, these references, including the '736 patent, disclose multipole ion guides, including quadrupole and octapole ion guides. JA601, 1:45-46, 49-50, 55-56, 60-61, 64, 66-67; 2:4-5, 25-26, 30-31. These cited references are evidence of how those skilled in the art understood the term "multipole ion guide" as of the filing date of the '784 patent, and of the inventors' own usage of the term. The cited '736 patent describes the structure of the multipole ion guide as a rod set to which an AC voltage is applied, as do the Whitehouse and Gulcicek[19] references.[20] The '736 patent also describes the function of the ion guide as confining ions radially along a longitudinal path, as do Teloy[21] and Whitehouse.[22]

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[19] Gulcicek *et al.*, U.S. Patent No. 5,852,294 (filed July 3, 1997). JA737-47.

[20] JA661 ('736 patent), 4:40 ("AC only rod set"); JA711 (Whitehouse), 9:10-14 ("When multipole ion guide 40 is operated in AC-only mode, every other rod has the same AC frequency, voltage and phase and every adjacent rod has the same AC frequency and voltage applied by a phase difference of 180 degrees."); JA745 (Gulcicek), 1:18-21, 1:65-2:1 ("Generally, four, six, eight, or more equally spaced parallel rods assembled in a circle are used as an ion guide in high efficiency capture, transmission, and/or storage of ions in a variety of mass spectrometers. . . . If the rod assembly is to be used as an ion guide, only AC voltage is applied to the alternating rods, with adjacent rods 180 degrees out of phase from each other.").

[21] E. Teloy & D. Gerlich, *Integral Cross Sections for Ion-Molecule Reactions. 1. The Guided Beam Technique*, 4 Chemical Physics 417 (1974). JA798-803.

[22] JA661, 3:51-52; JA654, Fig. 13 (showing ion trajectories) ('736 patent); JA800, 420, Fig. 3 (showing ion trajectories in a mass and velocity filter in a longitudinal cross section) (Teloy); JA709, 5:67-6:4 ("The AC field of the multipole ion guide traps ions within a radial cross section and prevents scattering losses of the ions undergoing collisions with the background gas as the ions traverse the ion guide length.") (Whitehouse).

The description of the preferred embodiment in the specification of the '784 patent also supports the definition of a "multipole ion guide" as a rod set to which an AC voltage is applied. The specification refers to the structural elements of the ion guide as "rods" and states that the "ion guides are operated by applying a AC voltages 31 and 32 to the poles which guide ions as is well known." JA603, 5:1-5. Thus, the specification uses the term "rods" interchangeably with the term "poles."

Thermo proposes that the term "multipole ion guide" be construed to mean "a device that confines ions radially and guides them along an extended ion path, as determined by multipolar electric and/or magnetic fields." This construction has several problems. First, Thermo includes no structural definition of a multipole ion guide in its construction, referring to it broadly as just a "device" despite the fact that the word "multipole" limits the structure of the device to one that has multiple poles or rods. Second, although Thermo does include the concept that the multipole ion guide "confines ions radially . . . along a longitudinal path," Thermo limits the longitudinal path to one that is "extended." D.I. 38, Ex. A at 15. There is no basis in the specification of the '784 patent for this limitation. Nowhere does the specification state or imply that the longitudinal path must be extended. Indeed, one of the ion guides in the preferred embodiment is 1.25 inches long. JA602-03, 4:67-5:1. Third, Thermo's construction includes "magnetic fields" as well as electric fields as providing the confining force. There is no support in the specification or in the prior art cited in the "Background" section for the inclusion of "magnetic fields." The specification states that the "ion guides are operated by applying a AC voltages 31 and 32 to the poles which guide ions as is well known." JA603, 5:3-5. The "well known" mechanism for by which ions are guided is the production of an "oscillatory *electric* field" within the space defined by the

rods that confines the motion of the ions in the radial direction. JA799 at 418 (emphasis added).

D. "Means Associated with One or Both Ion Guides for Increasing the Translational Kinetic Energy of the Adduct Ions" (Claim 1)

Proposed Construction: *The corresponding structure, material, or acts described in the specification is a DC offset voltage between the first multipole ion guide and the immediately preceding lens (ion guide 27 and skimmer 24), or a DC offset voltage between the second ion multipole ion guide and its immediately preceding lens (ion guide 28 and lens 18), or both.*

The parties agree that the following element of claim 1 is a means-plus-function element subject to 35 U.S.C. § 112, ¶ 6:

> means associated with one or both of said first and second multipole ion guides for increasing the translational kinetic energy of the adduct ions so that at the vacuum pressure of the second interface chamber adduct ions traveling into the chamber are converted into sample ions without fragmentation of sample ions.

The parties also agree on its function. The parties disagree, however, regarding the identification of the corresponding structure in the specification.

AB/Sciex proposes that the corresponding structure described in the specification be identified as "a DC offset voltage between the first multipole ion guide and the immediately preceding lens (ion guide 27 and skimmer 24), or a DC offset voltage between the second ion multipole ion guide and its immediately preceding lens (ion guide 28 and lens 18), or both." D.I. 38, Ex. A at 16. This construction derives directly from the words of the claim itself and the specification. The claim states that the "means for increasing the translational kinetic energy" is "associated with one or both of said first and second multipole ion guides." Thus, to identify corresponding structure in the specification, one must look for structure that performs the function of "increasing the translational kinetic energy of the adduct ions so that . . . adduct ions traveling into the

chamber are converted into sample ions without fragmentation of sample ions" and that is "associated with one or both of said first and second multipole ion guides." That structure is explicitly identified in the following passage in the specification:

> Although the *offset voltage which provides the translational kinetic energy* to the adduct ions has been described as applied *between the interstage lens and the second multipole ion guide*, it is apparent that the translational kinetic energy can be provided by applying *the DC offset voltage between the skimmer lens and the first multipole stage or by applying voltages simultaneously between each lens and its respective multipole ion guid*e.

JA603, 6:50-57 (emphasis added).

This passage states that what provides the translational kinetic energy to the adduct ions is (in positional order along the ion path): (1) "the DC offset voltage between the skimmer lens and the first multipole stage," or (2) "the [DC] offset voltage . . . between the interstage lens and the second multipole ion guide," or (3) "applying [DC offset] voltages simultaneously between each lens and its respective multipole ion guide." *Id.* The respective associated ion guides and lenses have reference numbers in the specification (first multipole ion guide 27 and skimmer 24; second multipole ion guide 28 and interstage lens 18). JA602, 4:59, 4:64-66; JA603, 5:20-24; JA593, Fig. 1. AB/Sciex's construction tracks the above-quoted passage in the specification and includes the reference numbers for the ion guides and lenses.

Thermo proposes that the corresponding structures "include a skimmer that precedes the first ion guide, a lens located between the first and second ion guides, and their associated voltage sources." D.I. 38, Ex. A at 16. Thermo divorces the phrase "associated with one or both of said first and second multipole ion guides" from the "means" recitation and proposes that it be separately construed to mean "that the 'means … for increasing' has a relation to either or both of the first and second ion guides." *Id.* at 16-17. There are several problems with these constructions.

First, Thermo's identification of what the corresponding structure includes is not consistent with the specification. The specification explicitly identifies what actually causes the increase in translational kinetic energy of the adduct ions: either the *DC offset voltage* between the skimmer (24) and first multipole ion guide (27) or the *DC offset voltage* between the interstage lens (18) and the second multipole ion guide (28), or both. JA603, 6:50-57. Thermo does not even refer to these DC offset voltages. Instead, Thermo identifies "a skimmer that precedes the first ion guide" (rather than the skimmer that immediately precedes the first ion guide, as described in the specification and shown in Fig. 1) and "a lens located between the first and second ion guides" (rather than the lens that immediately precedes the second ion guide, as described in the specification and shown in Fig. 1), and "their associated voltage sources." D.I. 38, Ex. A at 16. "The corresponding structure to a function set forth in a means-plus-function limitation must actually perform the recited function, not merely enable the pertinent structure to operate as intended. . . ." *Asyst Techs.*, 268 F.3d at 1371. Thermo's corresponding structure not only fails to perform the recited function, it does not even enable it to be performed. For the DC offset voltage to be present, (1) DC voltages must be applied to the skimmer and interstage lens, and (2) different DC voltages (DC voltages that are offset from the voltages on the skimmer and interstage lens) must also be applied to the first and second ion guides. JA603, 5:6-10. Having voltage sources for the skimmer and interstage lens does not produce DC offset voltages between either the skimmer and first ion guide or between the interstage lens and second ion guide.

Second, Thermo's separate proposed construction of the phrase "associated with one or both of said first and second multipole ion guides, " *i.e.*, "that the 'means . . . for increasing' has a relation to either or both of the first and second ion guides," is

hopelessly vague. D.I. 38, Ex. A at 16-17. The specification spells out the "relation." A DC offset voltage is applied between the skimmer and the first ion guide, or between the interstage lens and the second ion guide, or both. JA603, 6:50-57. Moreover the phrase "associated with one or both of said first and second multipole ion guides" is part of the recitation of the "means . . . for increasing" and does not need to be construed separately.

E. "Whereby to Increase the Sample Ion Current and Therefore the Sensitivity of the Mass Spectrometer System" (Claim 1)

Proposed Construction: *The sensitivity of the mass spectrometer system is increased due to an increase in sample ion current entering the mass analyzer that is caused by the conversion of adduct ions into sample ions in the second chamber without fragmentation of sample ions.*

"To Increase the Sample Ion Current and Therefore the Sensitivity of the Mass Spectrometer" (Claim 4)

Proposed Construction: *The sensitivity of the mass spectrometer system is increased due to an increase in sample ion current entering the mass analyzer that is caused by the dissociation of adduct ions in the second chamber without dissociating sample ions.*

AB/Sciex's proposed construction of the phrase "whereby to increase the sample ion current and therefore the sensitivity of the mass spectrometer system" has two elements: (1) that the sample ion current that is increased is sample ion current *entering the mass analyzer*, and (2) that the increase in sample ion current is a consequence of the conversion of adduct ions into sample ions *without fragmentation of sample ions*.

With respect to the first element, the phrase "whereby to increase the sample ion current and therefore the sensitivity of the mass spectrometer system" expresses a cause and effect relationship between increased sample ion current and increased sensitivity. Sensitivity is ascertained when sample ions are detected and a mass spectrum is produced. Ions are detected in the mass analyzer stage of the instrument. Sample ions

that do not enter the mass analyzer do not contribute to sensitivity. Thus, "to increase the sample ion current" refers to an increase in sample ion current *entering the mass analyzer*.

Indeed, the specification explicitly and repeatedly says so. Under the heading "Objects and Summary of the Invention," the specification states that as a result of the claimed adduct ion dissociation without fragmentation of sample ions, "the sample ion current *entering the analyzer* is increased, thereby increasing the sensitivity of the mass spectrometer system. JA602, 3:36-38 (emphasis added). Under that same heading, the specification also states that "adduct ions . . . are dissociated prior to analysis to increase the analyte ion current *to the mass analyzer* and the sensitivity of the mass spectrometer system." *Id.*, 3:41-44 (emphasis added). Again, under the same heading, the specification states "whereby to increase the sample ion current directed *into the analyzer* and the sensitivity of the mass spectrometer system." *Id.*, 3:55-57 (emphasis added). In the "Description of Preferred Embodiments," the specification again expresses the tie between sample ion current entering the mass analyzer and sensitivity, stating:

> The formation of adduct ions can significantly reduce the abundance of *sample analyte ions which reach the ana*lyzer. Consequently, effective conversion of the adduct ions into protonated molecular cations or molecular anions can greatly *enhance the sample ion current and the sensitivity of the mass spectrometer*.

JA603, 5:14-19 (emphasis added).

The prosecution history of the '784 patent confirms that "to increase sample ion current . . ." refers to increased sample ion current entering the mass analyzer. In arguing for the allowance of the claims in the face of a rejection over the prior art (Whitehouse), the inventors told the Patent Office that as a result of adduct ion conversion, "[t]he sample ion current *entering the analyzer* is . . . increased, increasing the sensitivity of the

mass spectrometer system." JA930 (emphasis added). Further, the inventors stated that the goal of vacuum chambers which precede a low-pressure mass analyzer is "to transport as many of the sample ions as possible . . . *to the mass analyzer*." *Id.* (emphasis added). In sum, the specification and prosecution history leave no doubt that the phrase "to increase the sample ion current . . ." means increasing the sample ion current *entering the mass analyzer*.

The claims, the specification and prosecution history are likewise clear that the increase in sample ion current is a consequence of the conversion of adduct ions into sample ions *without fragmentation of sample ions*. The phrase "whereby to increase the sample ion current and therefore the sensitivity of the mass spectrometer system" in claim 1 immediately follows the phrase "adduct ions traveling into the [second] chamber are converted into sample ions *without fragmentation of sample ions*." JA604, 7:30-34 (emphasis added). Similarly, in claim 4, the phrase "to increase the sample ion current and the sensitivity of the mass spectrometer system" immediately follows the phrase "to dissociate the adduct ions *without dissociating sample ions*." *Id.*, 8:13-17. Thus, the increase in sample ion current is the stated consequence of the conversion of adduct ions into sample ions *without fragmentation of sample ions* (or, in claim 4, *without dissociating sample ions*).

The specification also states that the increase in sample ion current is a consequence of conversion of adduct ions or dissociation of adduct ions to form sample ions without fragmentation of sample ions. JA602, 3:33-35 ("[A]dduct ions are converted into sample ions by collision induced dissociation *without fragmentation of sample ions* whereby the sample ion current entering the analyzer is increased" (emphasis added)); *id.*, 3:50-57 ("to dissociate any adduct ions at the pressure of the second

chamber *without fragmenting the sample ions* whereby to increase the sample ion current directed into the analyzer" (emphasis added)).

The prosecution history confirms that sample ion current is increased by dissociation of adduct ions without fragmentation of sample ions. JA930 ("[A]dduct ions . . . are dissociated or converted to sample ions *without fragmentation of sample ions*. . ."; "[A]dduct ions are converted into sample ions by collision induced association [sic] *without fragmentation of sample ions*. The sample ion current entering the analyzer is thereby increased . . . ." (emphasis added)).

Thermo's proposed construction does not specify that sample ion current *entering the mass analyzer* is increased, and thus is missing the connection between the increase in sample ion current and the increase in sensitivity. Also, Thermo's construction incompletely states the cause of the increase in sample ion current. It is not just "dissociation of adduct ions" in the second chamber, it is dissociation of adduct ions *without fragmentation of sample ions* in the second chamber. Inclusion of these elements is needed to accurately reflect the understanding that one skilled in the art would have of the phrases at issue based on the language of the claims themselves, the specification and the prosecution history.

F. "Applying a DC Offset Voltage Between a Selected One or Both Lenses and the Succeeding Multipole Ion Guide" (Claim 4)

Proposed Construction: *Applying a DC offset voltage to at least one of the lenses and the ion guide that comes immediately after it.*

The phrase "applying a DC offset voltage between a selected one or both lenses and the succeeding multipole ion guide" requires that a DC offset voltage be applied between at least one of the ion lenses and the ion guide that comes *immediately* after it. Thus, with reference to the antecedent terms in the preamble of claim 4, it encompasses

applying a DC offset voltage between "an ion lens defining the first evacuated chamber" and the "first multipole ion guide" or applying a DC offset voltage between an ion lens separating the "first and second evacuated chambers" and the "second multiple ion guide," or both. It does not encompass applying a DC offset voltage between the first lens and the second multipole ion guide.

The phrase itself recites that a DC offset voltage is applied between "a selected one or both lenses and *the* succeeding multipole ion guide." JA604, 8:10-11 (emphasis added). Thus, the phrase itself specifies that the DC offset voltage is applied between a lens and *the* multipole ion guide that comes after it, not a lens and *a* multipole ion guide that comes after it. *Warner-Lambert Co. v. Apotex Corp.*, 316 F.3d 1348, 1356 (Fed. Cir. 2003) ("It is a rule of law well established that the definite article 'the' particularizes the subject which it precedes. It is a word of limitation as opposed to the indefinite or generalizing force of 'a' or 'an.'" (citation omitted)).

The specification uniformly states that the DC offset voltage is applied between one or both of the lenses and the ion guide that comes immediately after it. In the "Summary of the Invention" section, the specification states: "A DC voltage source is connected to provide a potential difference *between the first lens and the first multipole ion guide or between interchamber lens and the second multipole ion guide or both*." JA602, 3:27-30 (emphasis added). In the "Description of the Preferred Embodiments, " the specification states that translational kinetic energy can be provided by applying a DC offset voltage "between the skimmer lens and the first multipole stage or by applying voltages simultaneously between each lens and its *respective* multipole ion guide." JA603, 6:53-57 (emphasis added). Nowhere does the specification state that a DC offset

voltage is applied between a lens that precedes the first multipole ion guide and the second multipole ion guide.

Thermo's proposed construction – "supplying DC voltage such that there is a voltage difference between at least one of the lenses and the ion guide that comes after them" – is flawed. First, it unnecessarily substitutes the phrase "supplying DC voltage such that there is a voltage difference" for the plain language of the claim, "applying a DC offset voltage." The phrase "applying a DC offset voltage" is clear by itself and needs no definition. Second, it does not require that the DC offset voltage be applied between a lens and the immediately following ion guide, contrary to the claim language and the specification. Thermo's grammatically awkward and ambiguous recitation "between at least one of the lenses and the ion guide that comes after *them*," can be read to encompass application of a DC offset voltage between the first lens and the second multipole ion guide because only the second ion guide comes after both lenses, *i.e.*, after *them*. On the other hand, Thermo's construction can be read so as *not* to encompass an implementation that the claim and the specification clearly contemplate, specifically, applying a DC offset voltage between the first lens and the first ion guide, because the first ion guide does not come after both lenses.

G. "Ion Lens"

Proposed Construction: *An electrostatic device for changing the path of an ion beam.*

The term "ion lens" appears in the recitation "first and second evacuated chambers separated by an ion lens for guiding analyte ions into said mass analyzer and an ion lens defining the first evacuated chamber" in the preamble of claim 4. JA604, 8:6-9. AB/Sciex proposes a straightforward construction that accurately defines an ion lens and distinguishes it from a multipole ion guide. A key characteristic of an ion lens is that it is

an *electrostatic* device (*i.e.* a DC voltage is applied to produce a static electric field), unlike a multipole ion guide, which is an electrodynamic device (*i.e.*, an AC voltage is applied to produce an oscillatory electric field). The specification presents that distinction in the "Background of the Invention," stating: "In many prior art systems, the ions are guided by *electrostatic lenses*. In other systems, the ions are guides by *electrodynamic multipole ion guides*." JA601, 1:42-44 (emphasis added). That distinction carries through the discussion of the prior art. In the midst of the discussion of several references that are said to disclose "multipole ion guides," the specification states that "U.S. Patent No. 5,432,343 describes *an ion focusing lensing system*" and "the use of an *electrostatic lens* in a transition flow region of the interface." JA601, 2:17-21 (emphasis added); *see also* JA707, 1:57-61 ("Two types of [e]lectrostatic elements have been used to transport and focus ions in vacuum, particularly where ions are entering vacuum from atmosphere pressure through a free jet expansion. The first is a static voltage lens and the second is a dynamic field ion guide."); JA805 at 788 ("Ions are . . . focused by an electrostatic octopole lens").

It is also clear that an ion lens changes the path of an ion beam, just as an optical lens changes the path of beam of light. In the "Background of the Invention," the specification states that "[a] tube lens or other electrostatic or electrodynamic *focusing element* may be associated with the capillary *to force ions to the center of the jet stream* leaving the capillary to thereby increase the ion transmission through the aperture of the skimmer." JA601, 1:29-33 (emphasis added). In the "Description of Preferred Embodiments," the inventors state that:

> [a] first ion lens is disposed at the input of the first interface chamber *for directing ions into the first multipole ion guide*, an interchamber ion lens is disposed between the first and second interface chambers *for directing ions into said second multipole ion guide*, and an ion lens or a lens stack is

> disposed between the second interface chamber and the analyzer chamber *for directing ions into said analyzer* for analysis.

JA602, 3:17-26; *see also* JA688 at 25-31 ("By applying the appropriate electrostatic voltages to the lens between the orifice through which ions enter from the viscous pressure regime and the orifice leading to the third pumping stage the electrostatic fields are shaped such that the ions are pulled closer to the centerline and focused while some collisions with background gas are occurring."); JA707, 1:47-51 ("Where multiple pumping stages have been employed, the electrostatic lens elements have been configured to serve as restricted orifices between vacuum stages as well as providing ion acceleration and focusing of ion into the mass analyzer.").

Clearly, in the '784 patent, an ion lens performs the functions of "focusing" and "directing" ions on a path. AB/Sciex's proposed construction that an ion lens is used for "changing" the path of ions is an accurate characterization of the functions of "focusing" and/or "directing" ions. In other words, as an ion lens focuses or directs ions to a particular path, the ion lens causes ions to move onto a path different than one that the ions would have moved onto in the absence of the ion lens.

Thermo's proposed construction, "a device to which *one or more voltages are applied* so that the device deflects ions and may be used to focus or otherwise to change the shape or direction of an ion beam without continuously confining the ions radially along an *extended* longitudinal path," is flawed because it is erroneously broad in one sense and erroneously narrow in another sense. D.I. 38, Ex. A at 18 (emphasis added). Because it does not specify that the voltages are DC voltages (or, more simply, that the device is electrostatic), it encompasses electrodynamic devices like multipole ion guides, thus erasing the distinction that the specification draws between an ion lens and a multipole ion guide. On the one hand, it introduces an unsupported distinction between

an ion lens and a multipole ion guide in the recitation "without continuously confining the ions radially along an *extended* longitudinal path." An ion lens and a multipole ion guide each may or may not confine ions radially along an extended longitudinal path. For example, Gulcicek *et al.* explain that their invention relates to the use of an electrostatic lens to confine ions radially along an extended longitudinal path: "electrostatic lens 28 has been added to specifically shape the electrostatic field in the second pumping stage 70 to increase ion transmission as indicated by the shaded area 62 through skimmer orifice 32 and on into the mass analyzer through aperture 100." JA689, 6:47-52.

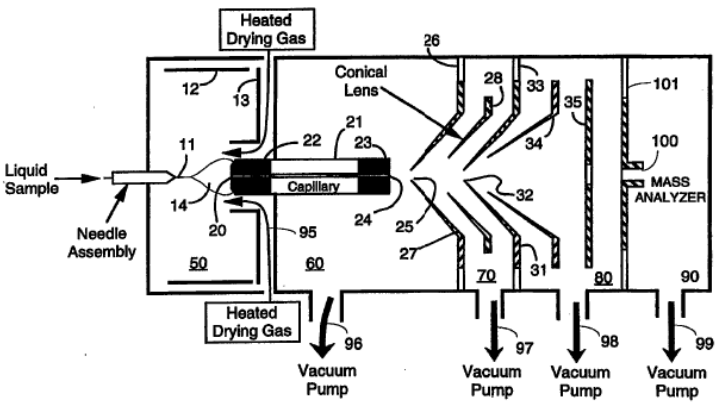

FIG. 1

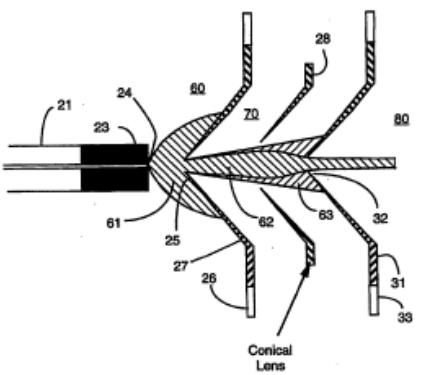

FIG. 2

JA 683, 684. On the other hand, multipole ion guides can be quite short and thus not confine ions over an extended longitudinal path. For example, U.S. Patent No. 6,015,972 to Hager, which is cited on the face of the '784 patent (JA591), discloses a short multipole ion guide – "RF only rods 35" – shown below. JA750.

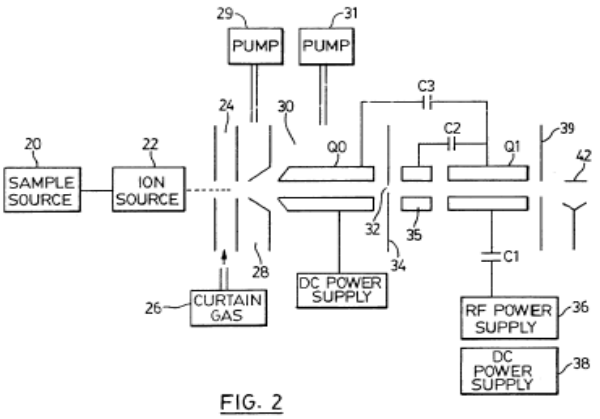

FIG. 2

Nowhere in the passages in the specification cited by Thermo, nor the rest of the specification or the prosecution history, do the inventors state or imply that an ion lens cannot confine ions radially along an extended longitudinal path.

H. "A DC Offset Voltage . . . Having an Amplitude so as to Provide Translational Kinetic Energy to Said Adduct Ions" (Claim 4)

Proposed Construction: *The DC offset voltage provides sufficient translational kinetic energy to the adduct ions entering the second chamber to dissociate them without dissociating sample ions at the pressure of the second chamber.*

The method of claim 4 contains the single step of:

> applying a DC offset voltage between a selected one or both lenses and the succeeding multipole ion guide having an amplitude so as to provide translational kinetic energy to said adduct ions to dissociate the adduct ions without dissociating sample ions at the pressure of the second chamber to increase the sample ion current and the sensitivity of the mass spectrometer system.

AB/Sciex's proposed constructions of the phrases "between a selected one or both lenses and the succeeding multipole ion guide" and "to increase the sample ion current and the sensitivity of the mass spectrometer system" are addressed above. The parties also dispute the proper construction of the remainder of this step: "applying a DC offset voltage . . . having an amplitude so as to provide translational kinetic energy to said adduct ions to dissociate the adduct ions without dissociating sample ions at the pressure

of the second chamber." AB/Sciex proposes that this limitation be construed to mean that "the DC offset voltage provides sufficient translational kinetic energy to the adduct ions entering the second chamber to dissociate them without dissociating sample ions at the pressure of the second chamber."

AB/Sciex's proposed construction clarifies two aspects of this claim element. The first is the meaning of "a DC offset voltage . . . *having an amplitude* so as to provide translational kinetic energy to said adduct ions to dissociate the adduct ions without dissociating sample ions." The specification does not use the term "amplitude" in reference to the DC offset voltage. However, the specification is clear that degree of dissociation of adduct ions is affected by the amount or magnitude of the DC offset voltage, particularly the DC offset voltage between the interstage lens and the second ion guide. JA603, 6:26-42 (Table 2). The specification states that as compared with applying a "standard 5 V DC offset," an "additional 10 volts DC offset voltage applied to the second ion guide . . . is *sufficient* to convert the solvent adducts into the protonated molecular cation of molecular anion for all compounds tested." JA603, 5:24-28 (emphasis added). Thus, based on the specification, "a DC offset voltage … *having an amplitude* so as to provide translational kinetic energy to said adduct ions to dissociate the adduct ions without dissociating sample ions" is one that provides sufficient translational kinetic energy to dissociate the adduct ions without dissociating sample ions.

The second clarification answers the question: What adduct ions are provided with sufficient translational kinetic energy? The claim itself refers to dissociation of adduct ions "at the pressure of the second chamber." It is implicit from the claim language that in order for adduct ions to be dissociated at the pressure of the second chamber, they must enter the second chamber. Indeed, the specification states that

inventors "discovered that the solvent adduct ions can be dissociated and converted into sample ions *in the second ion guide* . . . ." JA603, 5:20-22 (emphasis added). Making this explicit in the construction will be helpful to the jury. Therefore, the answer to the question is: "adduct ions entering the second chamber." AB/Sciex includes this in its proposed construction.

Thermo proposes the following construction: "[o]ne or more DC offset voltages provides translational kinetic energy such that, at the vacuum pressure of the second chamber, adduct ions that have entered the second chamber are broken up to form additional sample ions without fragmentation of sample ions." D.I. 38, Ex. A at 18. This construction has several problems. First, inclusion of the phrase "one or *more* DC offset voltages" is inconsistent with the claim language. The step recites "applying a DC offset between a selected one or *both* lenses and the succeeding multipole ion guide," not one or more. JA604, 8:10-11. Second, the construction does not address the meaning of "a DC offset voltage . . . having an amplitude so as . . . ." That is, it avoids the clear import of the claim language, read in light of the specification, that the amount of the DC offset voltage must be sufficient to produce the recited dissociation of adduct ions without dissociating sample ions. Third, although it includes the idea that the dissociation happens to adducts that are present in the second chamber, it is ambiguously worded. The phrasing "one or more DC offset voltages provides translational kinetic energy such that . . . *adduct ions that have entered* the second chamber are broken up" could be read so as to embrace merely applying a DC offset voltage so that *if* any adduct ions happened to have entered the second chamber they are broken up. The claim, however, clearly requires that adduct ions actually do enter the second chamber. Unless adduct ions actually do enter the second chamber and are dissociated there without dissociating

sample ions, it is not possible to satisfy the requirement of the claim that there be a resultant "increase in sample ion current." AB/Sciex's construction is clearer – requiring that the translational kinetic energy is provided to "*the* adduct ions *entering* the second chamber. . . ." Thermo's proposed construction should be rejected.

CONCLUSION

For the foregoing reasons, AB/Sciex respectfully requests that the Court adopt AB/Sciex's proposed claim constructions of the disputed claim terms in the patents in these consolidated actions and reject Thermo's contrary constructions.

Dated: November 18, 2005

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CERTIFICATE OF SERVICE

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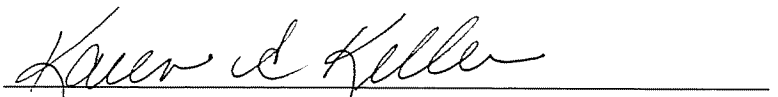

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